The Electrical Review

VOL. CXI. SEPTEMBER 23, 1932. No. 2861.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT, LONDON." Code, A B C. Telephone No.: Central 8871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to E.R. (1930) LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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A Case for Co-operation

THE original electric cookers were fearfully and wonderfully made. As with most early electrical appliances, they closely resembled their gas prototypes. They were iron boxes with resistances festooned inside them and they were not beautiful to behold. It was some years before they commenced to develop on lines of their own, and still the cleavage is not complete. But this development brought with it a curious consequence.

The electric cooker became a thing of mystery and wonder. Proud house-wives who had acquired one treated it with respect and showed it off to admiring friends. It would have been more at home in a drawing room than a kitchen. Naturally, the makers of electric cookers were compelled to be original—to give their models a little something the others hadn't got—and there grew up a tendency to forget that the primary object of a cooker was to cook.

Now we have arrived at the third stage. The electric cooker has become the essential part of the kitchen equipment in thousands of homes. Its utility, efficiency and many other attributes are unquestioned, and while the housewife is still proud of it and helps to extend its use, the numerous models developed during the second stage remain on the market and are still being improved and their numbers added to.

The last thing we wish to do is to cramp originality and individual enterprise, for it is only by this means that electricity has made such rapid progress. But too much variety inevitably leads to high costs, and it is questionable whether it is now necessary for the manufacturers of electric cookers to continue to produce so many designs in which the fundamentals are so similar.

Would not simplification and the employment of parts standardised in dimensions, at least, so reduce manufacturing costs as to lower considerably the price to the ultimate purchaser and thus provide more business for manufacturers, factors, retailers, contractors and supply authorities alike?

"Ah!" the reader will say, "what about the British Standard Cooker?" Well, although that particular experiment (for that is what is was) seems to have been shelved, we believe that there is a strong feeling among manufacturers that something has got to be done and that further developments are pending.

There is no doubt that some supply authorities are getting restive. No matter how good a cooker they adopt as "standard" for hiring schemes, their consumers will have their own ideas and express a preference for some other type. If they accede to these preferences they find that they must keep a multitudinous stock of replacement parts, and if they do not they lose business (and so do the manufacturers and other branches of the industry).

Another matter with which supply authorities are sometimes worried is the likelihood of dissatisfaction among their older cooker users when they see newcomers getting more modern patterns. Possibly the reduction of prices would enable the cost of the appliances to be written off in a shorter period, permitting of more frequent changes—again to the benefit of manufacturers and others.

Sooner or later cooker manufacturers will find themselves in the same position as the lamp makers and be forced to call a halt to the multiplication of designs. The results in the lamp industry have been beneficial to both manufacturers and the public; would not equal, or greater, benefits accrue to the cooker manufacturers if they followed a similar course?

A Wide Scope

"WHO hath despised the day of small things?" This well-worn quotation springs to the mind as one surveys the number of the larger electrical manufacturers who are exploring the smaller (but more remunerative) avenues which lead from the power station to the consumer. There is Ferranti's, for instance, whose annual meeting took place last week. For fifty years the name "Ferranti" has connoted large electrical plant—generators, cables and transformers, and particularly the latter in recent times. Of course there is also the Ferranti meter—

the company's first direct contact with the domestic consumer. The guiding brains of the company saw that the domestic consumer was the " coming man " and took steps to meet his requirements, while still continuing the manufacture of the heavier equipment. As a result the company is now known in connection with electric fires, clocks and radio apparatus to a wide public to whom the name " Ferranti " meant nothing before, however potent a word it was to electrical men.

Water and Maintenance

WE hope for the days when the amount of reserve boiler capacity will be on a more even footing with the installed turbine capacity. Turbines can be run for long periods between overhauls, which are usually major operations, but boilers have to be laid off at relatively frequent intervals for adjustments of a minor character. In recent years troubles due to collapsing arches and other furnace failures have subsided, but the increasingly higher duties required of the pressure parts emphasise the importance of suitable feed-water treatment. The quality of the feed-water is the principal factor in boiler maintenance, and it is here that the engineer must seek the help of the chemist. One deduction that may be drawn from the article by Mr. A. B. Owles in this issue is that the feed-water for modern power stations calls for regular investigations made on the spot by a qualified chemist if long non-stop runs are to be expected from the boilers.

Signs of Improvement

ALTHOUGH the output of electricity has continued to advance during the past year, there has hitherto been little or no corresponding effect upon employment in the various branches of the electrical industry. The August statistics relating to employment published by the Ministry of Labour indicate a there was a small increase in unemployment in general, electrical engineering, wiring and contracting, and cable wire and lamp production all reported fewer out of work. May this improvement continue!

Brief and to the Point

BREVITY is much more than " the soul of wit "; it is a time economiser. That is why we like the series of " Power Talks " produced by the Yorkshire Electric Power Co. for potential industrial consumers. The busiest works manager could not truthfully plead that he had no time to read them; yet all that he wants to know about the advantages of buying electricity is there before him. Number 4, relating to operating costs, sets out in striking tabular form all the items that make up the charges on his steam plant. He will readily agree, no doubt, that he ought to include all the factors given, but if left to his own devices his imagination sometimes may not get even beyond the first item, " fuel." It is surprising how seldom the costs of fuel and ash handling and especially ash disposal are taken into account without prompting; supervision, insurance, and the proper proportions of rent, load rates, and management, also are often omitted from the reckoning.

Railway Wisdom

IN our issue of September 9th we reported the completion of the L.M.S. railway electrification scheme between Barking and Upminster. This week we deal with the extension of the Piccadilly Railway to Arnos Grove. In each case four-rail working is used, but this is governed by the need for conformity with existing conditions on the Underground Railways, and therefore gives no pointer to future practice; where there is a free field the d.c. supply to trains will be given overhead at 1,500 V. But the two schemes in other respects are representative of certain important tendencies. One of these is the development of remote control of sub-stations in which mercury-arc rectifiers are increasingly used even for a d.c. voltage as low as 650. The other tendency is for railway authorities, even when possessing good power stations, to buy their power from outside sources, finding that this is the cheapest and most convenient arrangement. It indicates also ability on the part of the two power companies concerned—the County of London, and the Northmet—to appreciate the many intricate points involved in the negotiation of a traction supply.

Science and Industry

THE potential value in industry of discoveries that have had little influence on the trend of scientific thought in general is discussed by Dr. Harry Moore in the *Journal of Scientific Instruments* (a publication of the Institute of Physics and the National Physical Laboratory). While many of the greater scientific discoveries have had far-reaching practical effects, it is often the relatively insignificant that have yielded the best material results, such as the discovery by Hughes that the contact resistance of two pieces of carbon varied with the pressure between their surfaces. This was the origin of the microphone, which made practicable telephonic communication over long distances. Such minor discoveries can only be exploited to the fullest extent if the scientist understands the needs of industry. Of the work that our research associations have to their credit, none is more important than the opportunities they have given for bringing the industrialist and the scientist together to correlate what the one needs and the other can give.

Lighting Education

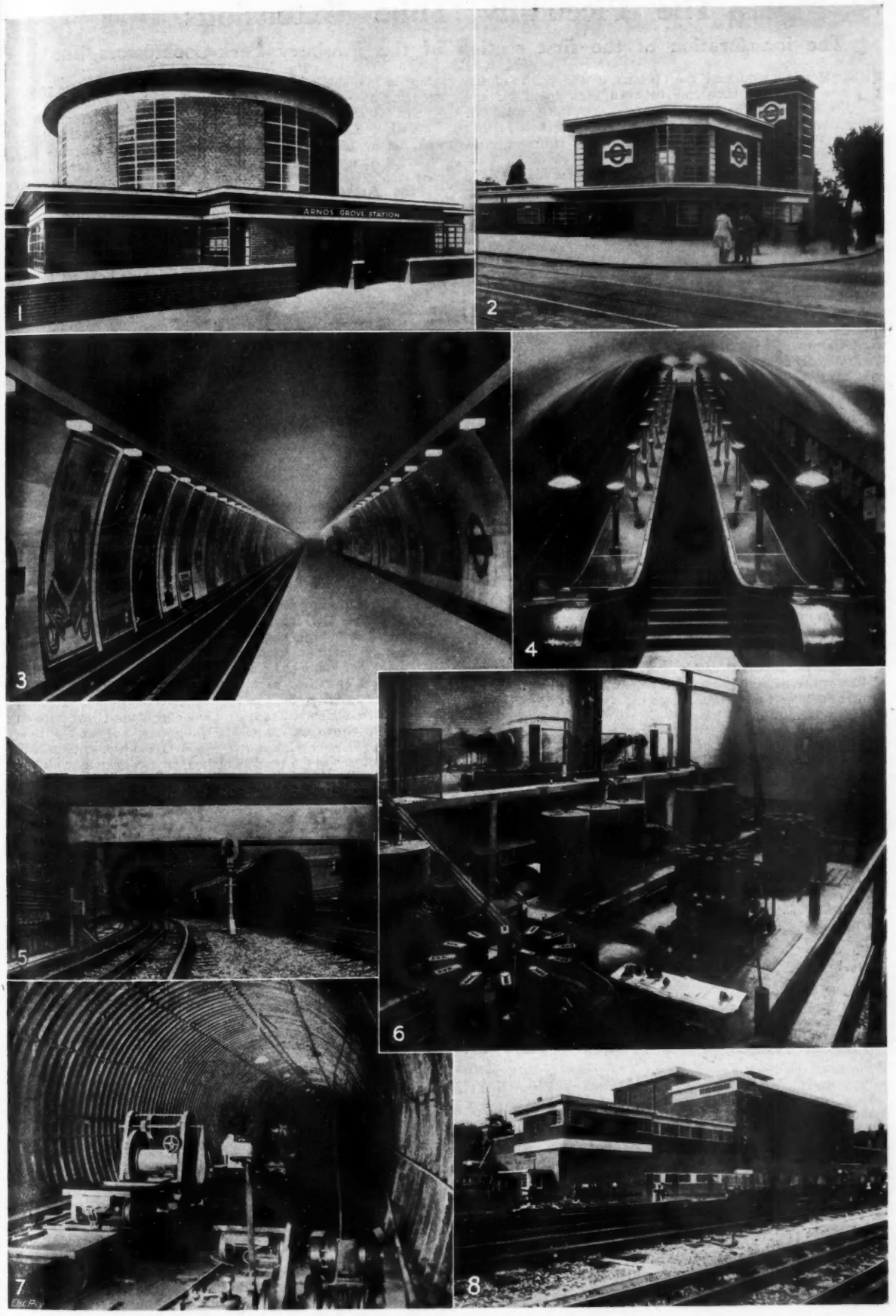
WHEN inspecting the extensions at the Lighting Service Bureau a few days ago we recalled one of the technical aphorisms of its manager. Mr. W. J. Jones once said to us, " You cannot have too much light, if it is properly applied." At Savoy Hill, with the assistance of his staff, and in particular we should imagine, of his architect, he has proved his case. No suggestion is implied that more light should be used than is necessary for any specific purpose. But most installations are very far indeed below the point at which an improved standard of lighting would fail to bring in an adequate return. Ample evidence of this is provided by the very clever and attractively arranged demonstrations at the Bureau. The place is not big enough to hold all those (whether lighting engineers or display men) who ought to see them, even if they could get there. We would suggest to the E.L.M.A. Council that they might consider the proverb about taking the mountain to Mahomet, and send replicas of some of the exhibits about the country.

A Modern Frankenstein

THE legend of yesterday becomes the fact of to-day in this age of miracles. The alchemist's dream is about to be realised, and the modern counterparts of Pygmalion and Frankenstein are finding that their creations can get out of hand and become troublesome. A correspondent tells us that Mr. H. May exhibited his " robot " " Alpha " at the Brighton Exhibition last week. He attempted to make an adjustment in the creature's anatomy to which " Alpha " evidently objected, for he gave his master a severe shock which completely knocked him out for a time. It seems that robots, unlike humans, require earthing during their lifetime.

No Gas Lighting

ALTHOUGH gas is to be supplied at Rotherham at 10d. per 1,000 cu. ft. as the secondary charge of a two-part tariff, electric light is still to be used in the Council houses. The cost of electricity for lighting has long since ceased to be the deciding factor. We believe that as more experience becomes available of the advantages of electricity for other services the same principle will apply to domestic uses generally.



Features of the new Piccadilly Tube extension from Finsbury Park to Arnos Grove

1. The Arnos Grove station. 2, 3 & 4. Exterior, platform and escalator at Bounds Green station. 5. Entrance to tunnel mouth at Maidstone Road, showing cabling system. 6. Interior of the Wood Green sub-station. 7. A section of the tunnel at Manor House. 8. The Arnos Grove sub-station.

The Piccadilly Tube Extensions

The inauguration of the first section of the Finsbury Park-Cockfosters line

LAST Monday witnessed the opening to the public of the new Piccadilly Tube line between Finsbury Park and Arnos Grove. The new tube, which is 4½ miles in length, is a portion of the larger extension to Cockfosters—a further three miles—which is progressing rapidly and will be opened early next year. The construction of the extension commenced in the autumn of 1930, since when approximately 3,500 men have been directly employed, all the materials used being British. The expenditure upon the whole extension to Cockfosters (not including new rolling stock costing £1,200,000) is £4,500,000.

Five new stations at Manor House, Turnpike Lane, Wood Green, Bounds Green and Arnos Grove will help to speed up transport in North London, and will relieve considerably the congestion at Finsbury Park. On week-days 347 trains will run each way between Wood Green and Hammersmith, of which 213 will operate over the Wood Green-Arnos Grove section, while there will be 170 through trains on the South Harrow line. A journey between Arnos Grove and Piccadilly Circus now takes only twenty-five minutes.

Constructional Details

The tunnel work was constructed from nine shafts and carried out in thirty-two sections; an average of half a mile of twin tunnelling was driven monthly. A special feature to assure speedy and smooth train operation is exceptionally easy curvature, and to reduce air pressure on trains the tunnel entry at Tewkesbury Road is of bell-mouth form.

In the tunnels the cables are supported on cast-iron brackets 3 ft. 4 in. apart, attached to the sides of the tunnel. In the open the brackets are bolted to concrete posts; where this method is impossible the cables are carried through fibre ducts in the concrete under or along the side of the track. In the platform tunnels the cables are likewise carried in ducts of fibre, 4 in. internal diameter, constructed in the concrete of the tunnel walls. The cables were supplied by Messrs. W. T. Glover & Co., Ltd.

The tunnels have the usual emergency system in the form of two wires running along the side. The contact of these two wires cuts off the current from the section of the line concerned by throwing out the appropriate circuit-breaker in the sub-station.

Colour-light Signals

The signalling system is entirely automatic, the colour light signals being controlled by track circuits. All signals are provided with train stops, which actuate the trip cock on the train and automatically apply the brakes if the driver does not stop when the signal is at danger. Two signal cabins are provided on the new line at Wood Green and Arnos Grove to permit the reversing of trains and the working of the connections to sidings.

At Arnos Grove the signal cabin is a two storey building, the cabin itself being on the upper floor with the room containing the relays and other signal apparatus immediately below it. In the relay room all the supports for the apparatus are of metal, flameproof cable is used for the wiring, and all the apparatus is mounted so as to be very readily accessible and easily kept clean. A hole in the floor beneath the interlocking frame with a platform and stairs below provides ready access for maintenance of the wiring and connections to the inside of the frame.

The Wood Green cabin is situated underground, and provision has been made for the signals and points to be worked automatically. The train describer apparatus, which normally informs the signalman of the destination of the train, has been connected up to the signal apparatus and now, instead of merely telling the signalman where the train is to go, sets the points and clears the correct signals for the route.

The train describers employed are of an entirely new type, and have been designed by the Underground staff especially for use on this line. The describer indicates the destination of the trains and also the stations at which the trains will not stop. Only two wires are used for carrying the descriptions, and the latter are stored up at each point by means of perforations in a paper tape. Twelve different destinations and twelve different non-stop codes can be handled by the apparatus. The Westinghouse Brake & Saxby Signal Co., Ltd., was responsible for the whole of the signalling apparatus.

Brighter Stations

The new stations mark various departures in Underground station design and architecture. With the exception of Manor House, which is of the basement type, all the stations have striking surface buildings of modern design, taking full advantage of available window space. Each has a distinctive colour scheme, and bronze work is employed to a large extent.

Except at Turnpike Lane, where the type "M" has been installed, the escalators are of the improved "MH" type, similar to those already in service at Hyde Park Corner and Marble Arch stations; they have a speed of 180 ft. per minute. At Manor House, as an experiment, two posts have been fixed at the bottom of one escalator with a view to breaking up the crowds of people and saving boarding time.

The artificial lighting schemes present several interesting features, indirect lighting being employed very largely. In the booking halls, floodlights on the top of the booking booths and specially designed floor standards project light on to the ceilings whence it is reflected downwards. In the subways, passages, &c., the method of illumination is similar to that at Piccadilly Circus station, being by means of obscured pressed-glass fittings set at intervals along the middle of the ceilings. Balustrade standards of bronze, surmounted by bronze bowls containing mirror-reflectors, are used for the escalators, while for the platforms there are small rectangular pressed-glass fittings, spaced about 7 ft. apart, on both the track and platform sides of the tunnels. Signs and train describers are designed to harmonise with the general lighting scheme. At Arnos Grove the whole of the exterior of the circular booking-hall is floodlighted.

The effects of the improved ventilating system are very evident. In addition to the usual plant, the service shafts have been retained for ventilating purposes. At all four stations extracting fans withdraw the air from the escalator machinery chambers, offices, &c.

The Power Supply

A three-phase, 50-cycle a.c. supply at 11,000 V for the extension is being provided by the North Metropolitan Electric Power Supply Co., from its Brimsdown station. As a precaution against failure, electricity for lighting the stations and tunnels is obtained from both Brimsdown and the Underground power house at Lots Road on separate circuits. For the Cockfosters extension as a whole the supply will be stepped down by five sub-stations of the remote control type. Three of these—Manor House, Turnpike Lane and Arnos Grove—are on the Arnos Grove section of the extension; but for the time being only Manor House and Wood Green sub-stations will supply power for the section named, in conjunction with the existing sub-station at Holloway Road.

Wood Green sub-station will be the key of the power supply. Attached to it are a distribution room and a control room, the latter—from which the whole of the sub-station plant will be controlled—having special indicator devices to reflect the phases of operation in each sub-station. In addition to the sub-stations situated on the Cockfosters extension, Wood Green will supply and control new remote-control sub-stations at Holloway Road and York Road.

The sub-station plant embraces transformers and air-compressors for the signalling, and transformers for railway lighting. Each sub-station on the extension has three 1,500-kW mercury-arc rectifiers for converting the supply to d.c. after it has been stepped down by the transformers to 650 V. An improved design of anode shield makes it possible for these rectifiers to be put on heavy load immediately when starting from cold. Each rectifier is provided with re-cooling equipment and a complete smoothing circuit is provided on the d.c. side. All the e.h.p. switchgear banks are of similar design both for the distribution and rectifier sub-stations, a two-floor layout being adopted with the oil circuit breakers above the main switchgear cells. All the sub-station plant is of B.T.-H. design and manufacture.

The Rolling Stock

The new all-steel rolling stock is already familiar to the public, as some of the cars have been in service for the past few months. The new cars are longer than former types, the salient features being structural improvements relating to the doors and ventilation, and better lighting arrangements.

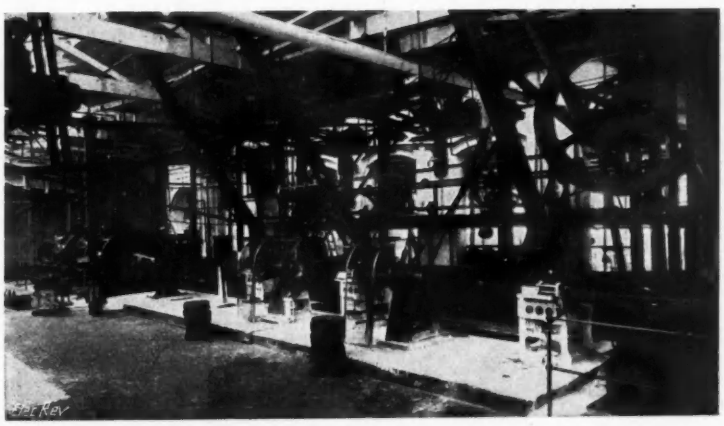
For variety there are distinct colour-schemes for interiors. The motor-cars have blue-patterned upholstery and grey and cream paintwork; the trailers have blue and buff upholstery and paintwork of two shades of blue.

The motor-cars each have two 240-h.p. G.E.C. motors, with shunt fields, which make for higher speeds. Control equipments are B.T.-H.; and the Westinghouse brakes are electrically operated. A seven-car train—made up of three motor-cars and four trailers—has a total of 1,440 h.p. available, permitting a schedule speed of 25 m.p.h., including stops. Under non-stop operation a train will attain a speed of 40 m.p.h.

Submarine Cable Insulation. By F. A. Middleton

Two new materials of great potentialities

ORDINARY low-speed telegraphy necessitates a cable path of low resistance only, provided by the copper conductor, which may be insulated with a material of moderate electrical resistance. With the introduction of loaded conductor cables the dielectric constant assumed greater importance, though the inductance of the loading metal tended to counterbalance it. Also the effect of the a.c. conductance, or power factor, of the insulation became more noticeable. So long as frequencies were low, the loss was not serious; but with the failure of long-distance wireless telephony to secure privacy of communication, it became apparent that, if cable telephony were to be achieved, a new insulating material must be developed, capable of withstanding the high frequencies involved.



High speed sheathing machines used in the manufacture of Siemens cables

The comparatively high power factor and dielectric constant of gutta-percha for this work are due, not to the actual gutta-percha hydro-carbon itself, but to resinous constituents and matter classed as dirt. By removing these sources of weakness by suitable mechanical or chemical means, a gutta-percha of permanently good quality for high-frequency transmission is obtained. Unfortunately, these substances constitute 40 per cent. or more of the commercial material, which makes the price, already very high, quite prohibitive. The resultant gutta-percha is, further, of too brittle a character for use.

"K-Gutta"

In order, therefore, to cheapen and soften the purified gutta, search was made for a suitable thermo-plastic substance which would not be water-absorbent, besides being cheap and electrically and chemically stable. Eventually, research revealed purified petrolatum as the ideal substance, with its ageing qualities suitably developed with an organic "antioxidant." The blended gutta-percha has been given the name "K-Gutta."

Its commercial preparation is, perhaps, of greater interest to chemists than electrical engineers, but it is quite simple. The raw gutta is warmed and shredded, then dried in warm air, and deresinified by circulating petrol around it at a temperature insufficient to cause solution of the gutta-percha hydro-carbon. By subsequently dissolving the hydro-carbon in a separate quantity of petrol, the "dirt" can be removed by filtration. To recover the hydrocarbon from this solution involves either distillation or freezing, in which latter case the solid comes down as a fine precipitate. The petroleum jelly may be added to this solid in the usual type of mixing machine, or it may be brought into union with the gutta while in solution and before distillation.

The machinery which is of general use for cable covering can be used, provided that care is taken over working temperatures. The only difference of manufacture occurs after this process. In order to stabilise the mixture, both mechanically and electrically, special heat treatment is applied. Evidence of the success of manufacture has been obtained with the aid of twelve months' immersion in sea-water under sea-bottom conditions. The ratio of conductance to capacitance was only one-twentieth of that for ordinary gutta-percha, while the dielectric constant showed an improvement of 25 per cent. Tensile strength showed an increase of 40 per cent., while brittleness and softness were almost identical.

Ageing conditions of every sort are less injurious to the new substance than to the old, whether warm air, sea-water, hydrogen peroxide, or even ultra-violet light is the destructive medium.

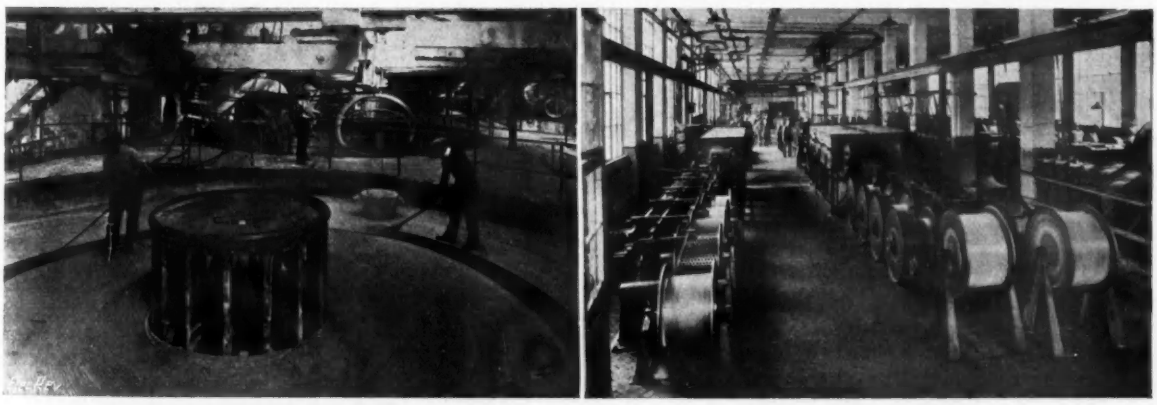
An outstanding feature of its manufacture is the elimination of personal error. For the satisfactory development of submarine telephony this must prove an extremely useful attribute.

A New Treatment for Rubber

The treatment of rubber with the same object in view (namely, to increase the dielectric strength and power factor) bears a close resemblance to this treatment of gutta-percha, except that the process aims at achieving its object before the solid rubber has been produced by latex coagulation.

Rubber is useless as an insulating material, for on immersion a gradual increase of dielectric constant ensues, accompanied by a decrease in insulation resistance, when a sudden complete breakdown in electrical properties occurs, as the result of the conducting path formed by wet protein films.

Important points of resemblance between the manufacture of "K-Gutta" and the production of non-absorbent rubber are that both depend upon special heat treatment for their efficacy, and both rely upon the addition of a thermo-plastic substance for their mechanical properties. Instead, however, of needing the addition of these materials to reduce brittleness, as is the case with "K-Gutta," rubber requires them to increase its stiffness at ordinary temperatures.



Cable storage tanks and the annealing shop showing electrically heated furnaces at Siemens's Woolwich works

Uncoagulated latex is diluted with water in sufficient quantities to produce considerable dispersion of the rubber particles. Before coagulating the latex, this mixture is submitted to a short application of heat, but not quite sufficient to boil the solution. The latex is then coagulated, and softeners are added (such as palm oil, or balata, when this substance is intended for the covering) in order to assist in the removal of impurities. Thorough washing follows, and the rubber may next be mixed with the thermo-plastic stiffeners alluded to. Vulcanisation is the same as for ordinary types of rubber.

Sea-water conditions have been reproduced in conducting prolonged tests upon this new rubber, and the material has emerged with all its electrical properties unimpaired.

Triode Regulators. By N. A. J. Voorhoeve and F. H. de Jong

Rapid and accurate voltage control

FOR controlling d.c. electromagnetic devices will operate with an accuracy of about 0.5 per cent. which is not sufficiently precise for some purposes. By the use of a triode valve regulator, however, an accuracy approximating to 0.1 per cent. is obtainable, and this device is, moreover, quick-acting, regulation taking place in a fraction of a second. The working principle is illustrated in fig. 1, which represents the circuit diagram of a d.c. dynamo, with separate excitation, whose terminal voltage is maintained constant with the aid of a triode connected in series with the field winding. The grid of the regulating triode is connected to a potentiometer P across battery U. The potentiometer shunts the terminals of the dynamo, easing adjustment of the grid bias and ensuring

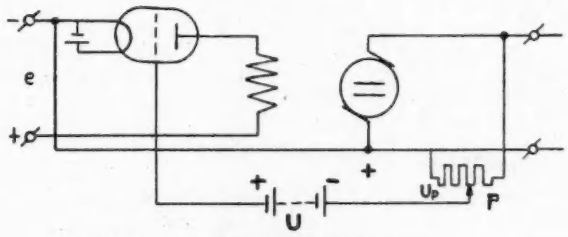


Fig. 1.—Principle of the triode regulator

that the battery, at high dynamo voltage, does not attain too high a value for practical use.

The filament of the triode is connected to the positive terminal of the dynamo; the voltages taken from the potentiometer Up and from the battery (U) counteract each other, Up being so much greater than U that the grid bias has a negative potential with respect to the filament. Now, if the dynamo load is increased the corresponding decrease of the terminal voltage will entail a drop of Up, so that the grid becomes less negative with respect to the filament. This also means a decrease of the resistance formed by the triode in the field

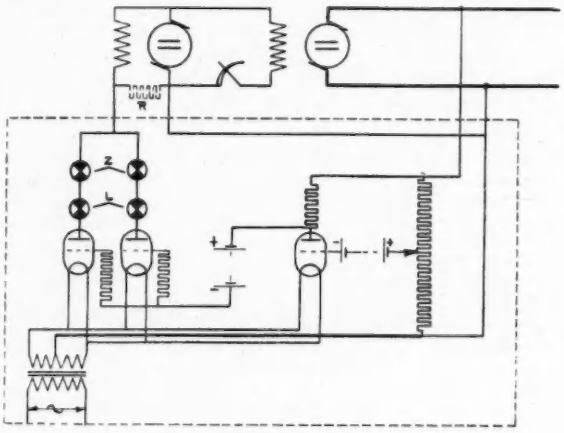


Fig. 2.—Diagram of the d.c. regulator

circuit. The field current increases, the voltage drop at the terminals is counteracted, and consequently the voltage is kept constant.

Instead of being connected in series with the exciting winding, the regulating triode can also be mounted in parallel. In this instance a fixed resistance should precede the exciting winding. In practice, the fluctuations of the generator voltage are not applied directly to the grid of the regulating triode, but through an input amplifier.

Practical Arrangement

The circuit of the Philips triode regulator (fig. 2) comprises a one-stage resistance coupled amplifier, and is such that an increase of the generator voltage results in an increase of the grid bias of the first amplifying triode. This causes a magnified increase of the grid bias of the power triodes, so that the field current of the exciting dynamo main drops. Consequently the excitation of the generator is also reduced. In certain circumstances it may be desired to shunt the power triodes by a resistance R. The filaments are fed by a transformer connected to an existing a.c. main. For the anode voltage of the amplifying triode the generator voltage itself is used.

To ensure reliability several power triodes in parallel are used. Furthermore, the anode circuit of each includes a fuse lamp Z and an indicator lamp L (fig. 2), whilst the grid of each triode is in series with a high ohmic resistance. These measures have the following advantages:—

During normal operation the indicator lamps burn, so that any disturbance of one of the triodes is immediately detected. The fuse lamps Z operate as soon as the anode current of one of the triodes increases excessively due to a short-circuit in the triode. When a short-circuit occurs between the grid and the filament of one of the triodes, the high ohmic resistance in the grid circuit prevents the grids of the other triodes from carrying the filament potential. The breakdown of one triode has but little influence on the generator voltage, as the other triodes automatically take over the function of the defective one.

The accessories mentioned, shown within the dotted rectangle in fig. 2, are all incorporated in the cabinet (fig. 3), excluding the grid batteries. The cabinet can be built into a switchboard. The triodes and lamps are easily accessible from the front; the terminals are at the back and the dimensions are 10 in. by 11⅜ in. by 7⅞ in. deep.

Operation

When using an exciting dynamo the Philips triode regulator can be applied to d.c. generators of approximately 100 kW, or under certain favourable conditions far greater outputs. Further, there is the possibility of increasing the generator voltage with load, or of obtaining a perfectly equal voltage at two specific load conditions by making the load current act upon the grid bias of the amplifying triode (compounding).

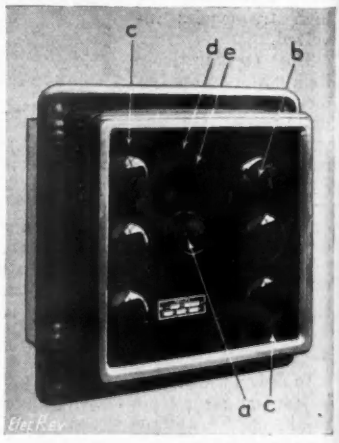


Fig. 3.—The Philips triode regulator: (a) Control knob of the potentiometer; (b) amplifying triode; (c) power triodes; (d) fuse lamps; (e) indicator lamps

The regulator is also suitable wherever the resistance of any circuit is to be controlled according to the fluctuations of a d.c. voltage, *e.g.*, for controlling the speed of rotation of d.c. shunt motors, in which case a tachometer dynamo has to supply the fluctuating d.c. voltage. As an example of practical application such a device controlling a 40-kW, 130-V. three-phase d.c. converter, with a 0.45-kW exciting dynamo, in the Philips physical laboratory keeps voltage fluctuation within at most 0.1 per cent. of the generator voltage (including changes in the speed of rotation of the driving motor).

An A.C. Regulator

Practically the same principle can be used for controlling the voltage of a.c. generators. Fluctuations in voltage act upon the grid bias of a few power triodes connected in parallel, of which the anode circuit is in series or in parallel with the magnet winding (fig. 4). A transformer T, which supplies the anode and filament voltages of a full-wave rectifier G, is connected to the voltage to be regulated. The filaments of the amplifying and power triodes are also fed by this transformer. The

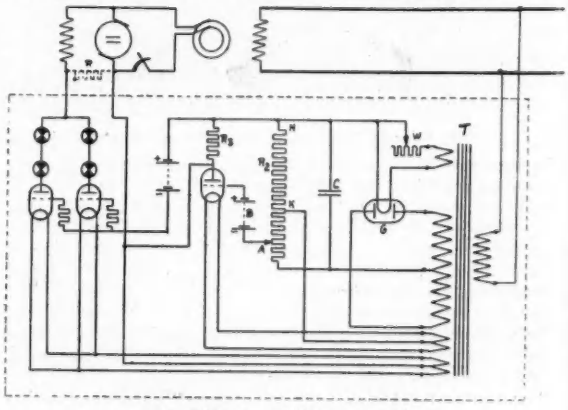


Fig. 4.—Diagram of the a.c. regulator

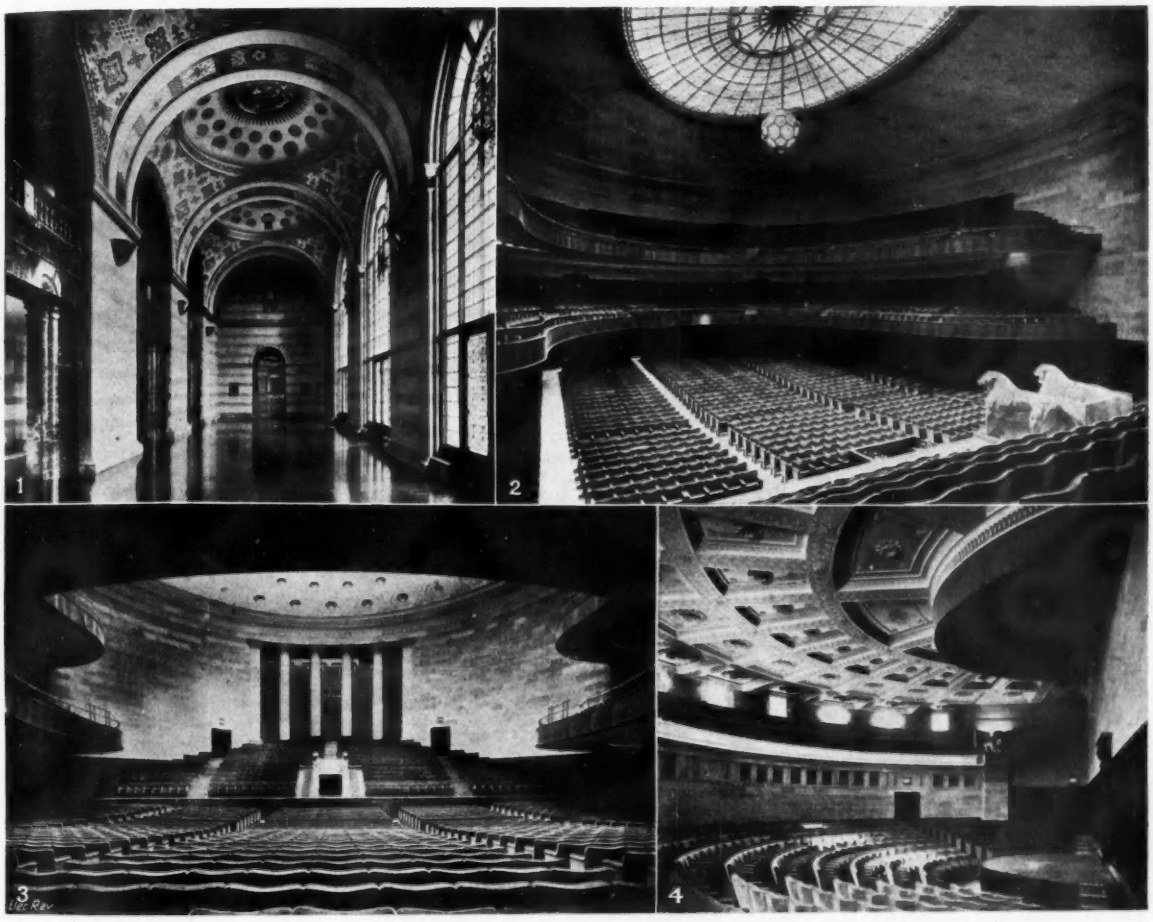
Sheffield's New City Hall

IN the lighting of the new city hall at Sheffield, which was officially opened yesterday, shadowless illumination has been avoided as far as possible. The great hall, which is elliptical in shape, has a major axis of 135 ft., a minor axis of 101 ft., and a maximum height of 60 ft. It contains two horse-shoe shaped galleries and a platform for a large orchestra, and will seat 4,000 people. The hall is without windows, and is illuminated by day and night from an oval lay-light, 70 ft. by 40 ft. (said to be the largest in existence), which can be shut off within one minute by a steel blind.

The main entrance hall measures 80 by 20 ft., and is 38 ft. from floor to ceiling. It contains a series of three domes decorated with heraldic designs; these are illuminated from wall boxes of the new blue mirror-glass. The semi-circular hall (40 ft. radius) has one gallery. In front of this is a trough concealing the lamps and their reflectors which provide the main lighting. The latter is supplemented by opalescent tubes between the windows and reflectors concealed behind the canopy that give an intense illumination on the platform.

The largest of the three rooms below the great hall has a glass floor (100 by 70 ft.), lighted from below in several colours. Provision has been made for floodlighting the building at night.

The acoustic properties of the building are reported by the B.B.C. to be very good. To reinforce these an extensive system of microphones and loud speakers has been installed. The architect is Mr. E. Vincent Harris. The electrical installation was designed and supplied by Messrs. Griersons, Ltd., and Mr. E. Morgan, city electrical engineer, provided local labour.



The new Sheffield Civic Centre

1. The entrance hall. 2. The main auditorium showing the laylight. 3. Another view of the main hall. 4. The semi-circular hall

Triode Regulators *(Concluded from the opposite page)*

rectified a.c. is smoothed by condenser C, the terminals of which are shunted by a resistance from which the anode voltage N-K and the regulating voltage K-A for the amplifying triode are tapped. The adjustable connection A is coupled to the grid of this triode through a bias battery B. The grids of the power triodes connected in parallel are led across high ohmic resistances and a bias battery to one terminal of a resistance R, the other being connected to the filaments. The voltage fluctuations applied to the grid of the amplifier are magnified in this circuit and transmitted to the grid of the power triodes.

It is not actually the generator voltage which is kept constant, but the rectified a.c. voltage at the condenser. The rectified voltage is not always proportional to the r.m.s. value of the a.c. voltage, and in order to eliminate this inconvenience the rectifier is made to work in the saturation area.

In the non-saturated area it is the anode voltage which chiefly influences the emission, whilst the temperature of the filament (which depends on the filament voltage and consequently on the r.m.s. voltage of the generator), has but little influence. In the saturated part it is just the reverse, and working in this area is made possible by adjusting the temperature of the filament by means of a resistance W.

The special circuit has the advantage that if the triode were suddenly to lose its emission (*e.g.*, owing to rupture of the filament) the generator voltage would fall, as in this instance the voltage through resistance $R_s=0$, so that the grids of the power triodes would become strongly negative with regard to the filament.

Construction and Use

The accessories are incorporated in a case similar to that of the d.c. regulator and the external dimensions of the two cases are identical. The triode regulator for a.c. is used only when very great accuracy is required (when approximate accuracy suffices the Philips diode regulator is recommended). The output of the generators with which the a.c. regulator can be used is of the same order as that of the triode d.c. regulator.

As an example, in the physics laboratory at Delft a 10-kW d.c. shunt motor operates three 5-kW single-phase generators, the frequencies of which can be continuously regulated by changing the speed of the shunt motor, *i.e.*, with the first generator from 50 to 115 cycles, with the second generator from 100 to 230 cycles, and with the third generator from 220 to 500 cycles. The exciter coils of the three generators are fed by a special exciting dynamo of constant speed and the regulator can be switched over to the three generators for controlling the field-winding of the exciting dynamo. In this way very accurate control is obtained at fluctuating loads and changing speed.

The Catford Stadium

A novel system of dual lighting at a dog-racing track

THE majority of greyhound tracks have been adapted from some other use and the electrical equipment has usually been improvised later, but Catford Stadium has been designed and built specifically as a dog-racing track.

Electricity is supplied by the South Metropolitan Electric Supply Co., which put down a special sub-station with 100-kVA of transformer gear; the connected load is somewhat in excess of this figure, but the peak is of short duration. The main switchboard consists of an iron framework supporting an ironclad bus-bar chamber, and three triple-pole switchfuses with links in the neutral. Two of these switches have a capacity of 200 A per phase, and control the feeders to the east and west stand switchboards. The third (60 A) controls a local distribution board installed in the main switchroom, which supplies the lights along the entrance road and the approach roads to the east and west stands, and the change lights which are "blacked out" during the races. The Brookhirst triple-pole contactor coupling the bus-bars is permanently bridged by Cressall resistance mats which enable the stand lights to be dimmed instead of totally extinguished, avoiding the need for separate circuits for police lights. The ironclad main switchgear was supplied by Messrs. W. McGeoch & Co., Ltd., of Birmingham.

The track lighting equipment comprises forty-eight tubular steel poles, each carrying a vitreous enamelled skirted dispersive reflector containing a 1,000-W lamp. A separate twin core p.i. armoured cable, looped into every third pole, feeds four lamps.

The Prevention of Glare

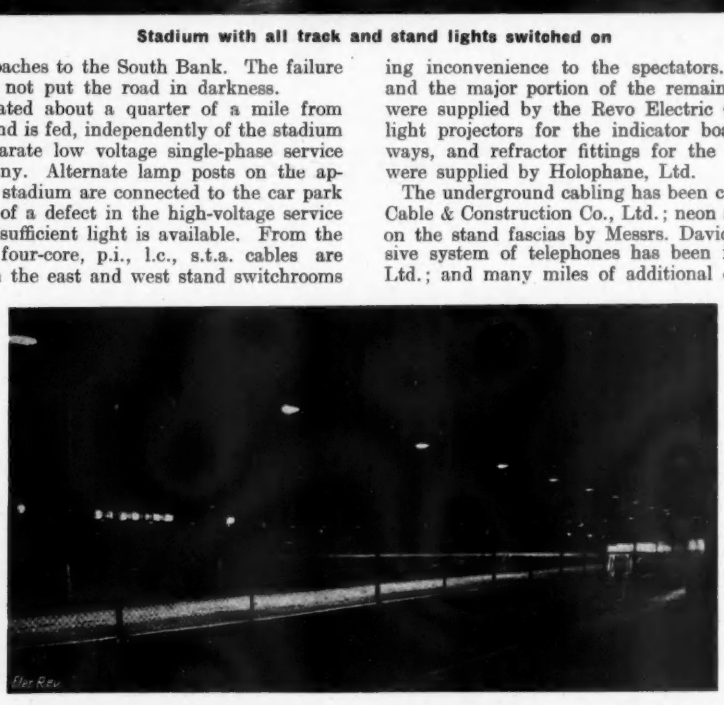
The Catford track is the first to be provided with a new form of spillguard, which provides a sharp cut-off at each side and entirely prevents the hitherto unavoidable glare caus-

Stadium with all track and stand lights switched on

and payboxes and approaches to the South Bank. The failure of any one circuit will not put the road in darkness.

The car park is situated about a quarter of a mile from the main switchroom, and is fed, independently of the stadium sub-station, from a separate low voltage single-phase service from the supply company. Alternate lamp posts on the approach roadways to the stadium are connected to the car park service, so that in case of a defect in the high-voltage service or stadium sub-station, sufficient light is available. From the main switchroom two four-core, p.i., l.c., s.t.a. cables are taken to switch-fuses in the east and west stand switchrooms respectively. A similar cable, with switchfuses at each end, interconnects the switchrooms, thus providing a ring main.

The lights on the track and stands are all controlled by push buttons from a central point, and during the running of a race the stand and bank lights are "blacked out."



Stand lights switched off, showing cut off of illumination near edge of track

Grand-stand Switch Rooms

Each switchboard at the two stands consists of three panels with a separate bus-bar chamber. The centre panel accommodates the incoming feeder and the interconnector. On the outgoing side are switch-fuses controlling power and heat, and all the lighting circuits not switched from the control room, such as offices, buffets, lavatories, and kennels.

At one side a second panel, for supplying half the track lighting, is connected to the feeder panel by a triple-pole contactor switch. Six d.p. switch-fuses control the outgoing cables, each of which supplies four track lamps. The third panel, at the other side of the feeder section, supplies all the ing inconvenience to the spectators. These special fittings, and the major portion of the remaining lighting equipment, were supplied by the Revo Electric Co., Ltd. Special floodlight projectors for the indicator boards and entrance gateways, and refractor fittings for the roadways and paddocks were supplied by Holophane, Ltd.

The underground cabling has been carried out by Callender's Cable & Construction Co., Ltd.; neon signs have been installed on the stand fascias by Messrs. David Allen, Ltd.; an extensive system of telephones has been installed by Dictograph, Ltd.; and many miles of additional cabling is being laid by Lightning Automatic Totalisators, Ltd., for use in connection with their apparatus.

The "Breco" silent hare comprises an endless wire-rope haulage (running in a trough beneath the centre of the turf), combined with a special gripping pulley drive for the skid carrying the hare. The speed is regulated by a specially wound d.c. motor working off a fluctuating voltage controlled by a modified application of the Ward-Leonard system.

The length of the course is 410 yards and the speed range of the installation is from 0.60 m.p.h. This plant, the first of its kind, was designed and installed by the British Ropeway Engineering Co., Ltd., for whom the electrical equipment has been supplied by the English Electric Co., Ltd. The races are automatically timed with apparatus supplied by Radiovisor Parent, Ltd.

The architect was Mr. G. E. Marshall and the wiring contractors Messrs. W. J. Furse & Co. (London), Ltd. The consulting engineers are Messrs. Murray Coombs & Richards.

Water Power in Palestine

The first stage of the Jordan River scheme is now operating

THE hydro-electric power development scheme of the Palestine Electric Corporation, Ltd., which was formed in 1923 to acquire the concession that was granted to Mr. Pinhas Rutenberg, of Jerusalem, provides for the utilisation of the fall of the River Jordan between Lake Tiberias and Jisr-el-Mujamyeh, which amounts to 160 ft. in eight miles.

The machine hall at Jisr-el-Mujamyeh

The waters of the Yarmuk, which flow into the Jordan about 4.5 miles south of Lake Tiberias, form a supplementary part of the scheme, and work on this section is now being proceeded with.

The towns of Jaffa, Haifa, and Tiberias obtained supplies of electricity initially from oil fuel stations which were established temporarily with the idea of superseding them when the harnessing of the Jordan's waters had been completed.

The Existing Plant

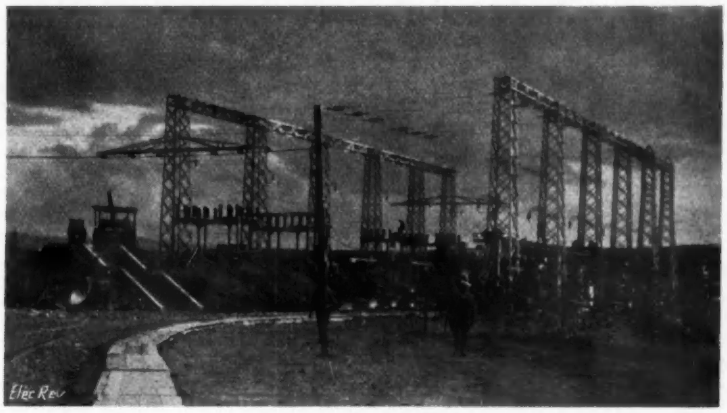
The Jordan power house at Jisr-el-Mujamyeh contains at present two Francis water turbines, each of 8,500 h.p., directly coupled to 6,300-V alternators, and there is room for two additional turbo-alternator sets of similar size for future extensions. The 6,300-V generators are directly connected to 7,500-kVA transformers, stepping up the voltage for transmission over a double circuit 66-kV line to Haifa and Telaviv. At present only one 66-kV circuit has been completed, from Haifa to Telaviv; the second circuit of the line will be added at a later date when it is required. The 66-kV switchgear installed at the Jordan power house and the sub-stations at Telaviv and Haifa is of the outdoor type.

At present the transformer station at the Jordan power house consists of the above mentioned 7,500-kVA transformers and two outgoing 66-kV feeders; that at Haifa of two 3,750-kVA 60/22-kV transformers, two incoming and one outgoing 66-kV lines; and that in Telaviv of two 3,750-kVA 60/22-kV transformers and one incoming feeder.

The Transmission System

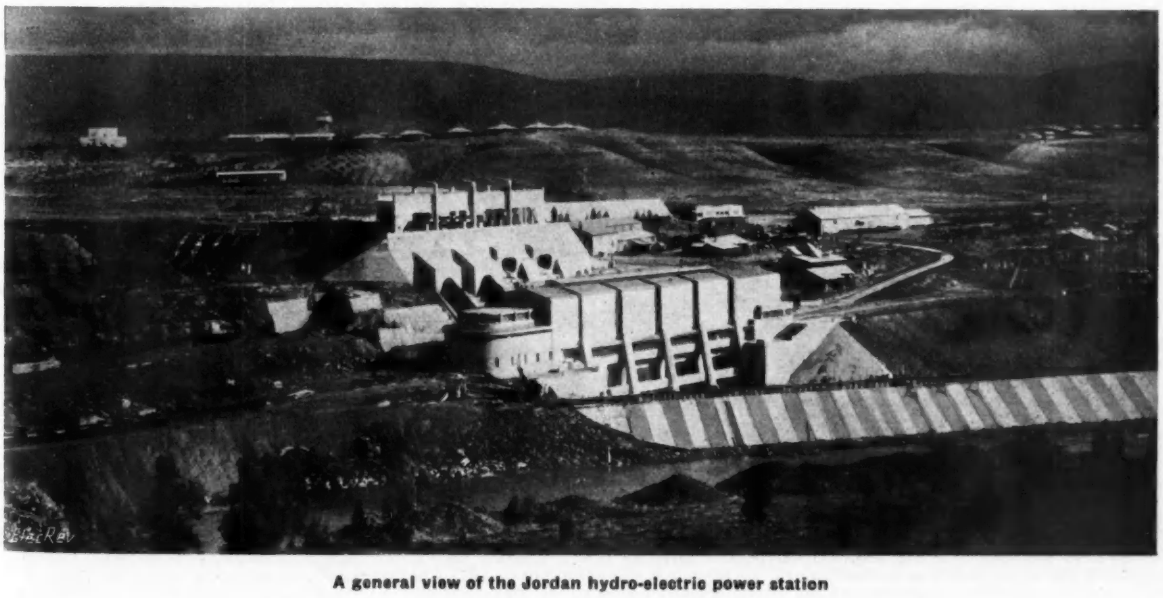
From the Jordan power house 6,000-V supplies are also given to Dgania, Kinereth, and Tiberias through a transmission line which is fed directly by the generators. Rural supplies are provided from the sub-stations at Haifa and Telaviv by 22-kV lines, outgoing from the 60,000/22,000-V stepping-down transformers. The supply of power at 6,300 V to the towns Telaviv, Jaffa, and Haifa is obtained from 22/6-kV transformers, two of which, each of an output of 1,000 kVA, are installed at Haifa and Telaviv. A third 22/6-kV transformer of 2,000 kVA is now being installed at Telaviv.

There are also Diesel engine generators in Telaviv and Haifa, generating at 6,300 V, which are used as stand-by power stations. The present capacity of the Haifa power house is 1,000 kVA and that of the Telaviv station is 5,000 kVA. There is also a small stand-by power house at Tiberias with Diesel engines and 125-kVA, 400-V generators.



A transformer station

We are indebted to the Palestine Electric Corporation, Ltd., for the foregoing information and the accompanying illustrations.



A general view of the Jordan hydro-electric power station

Feed-water Treatment. By A. B. Owles, A.I.C.*

Problems arising in modern high-duty boilers

ALTHOUGH the tendency has been to use purer water for boiler feeds, troubles have become intensified under the increasingly severe operating conditions in modern power stations. Traces of impurities, such as silica, calcium sulphate, etc., that were of little importance a few years ago may now cause considerable trouble. Furthermore, inherent weaknesses in the older methods of treatment have been revealed, largely as a result of research in this country and abroad.

Normally, condensate is sufficiently pure, apart from possible gaseous or volatile impurities, to warrant little or no chemical treatment, but the make-up water almost always requires careful attention. Thus, blistered tubes resulted from the use of a 3 per cent. make-up containing only 0.5 gr. per gal. of calcium sulphate, although the total feed water contained only 1/30th of this amount. Concentration of solids takes place very rapidly in modern boilers in which the evaporation per hour may be more than the water holding capacity.

Composition of Solids

The following table of average analyses illustrates the main difference in the composition of water obtained from a number of sources, the figures being expressed in grains per gallon.

	1.	2.	3.	4.	5.	6.	7.
Source.	Rain.	Lake.	Lake.	Deep well.	River.	Canal.	Mine.
Calcium carbonate .	0.1	1.1	3.9	11.7	8.8	0.4	23.4
Magnesium „ ...	—	—	2.4	11.3	—	7.4	—
Sodium „ ...	—	—	—	2.0	—	—	0.9
Calcium sulphate ...	1.6	1.8	1.6	—	6.1	22.6	13.5
Magnesium „ ...	0.2	0.7	—	—	4.3	—	—
Sodium „ ...	—	—	—	3.0	6.3	—	—
Magnesium chloride	—	0.8	—	—	—	—	30.0
Sodium „	0.3	1.0	0.3	0.6	9.0	6.1	330.0
Silica	—	0.2	0.4	0.2	0.2	0.3	2.1
Degrees temp. hard.	0.1	1.1	6.8	25.2	8.8	9.2	23.4
„ perm. „	1.4	2.8	1.2	—	9.6	16.6	41.4

Waters such as (1) and (2), which contain little soluble matter, will only require conditioning before being mixed with the condensate. Nos. (3) and (4) are waters which should be softened before use, and if well clarified will provide ideal boiler make-ups. The river and canal waters, even if suitably softened will still contain appreciable amounts of soluble matter. Water No. (7) could only be used under exceptional circumstances and would call for the use of evaporators. This water happens to be alkaline but mine waters are frequently acid.

Hardness salts cause the formation of dense adherent scale, resulting in blistering and failure of the metal, or reactions under the influence of heat resulting in pitting and corrosion. Soluble salts, such as chlorides and sulphates, stimulate corrosion, especially the former.

Temporary and Permanent Hardness

Most natural waters contain varying amounts of calcium and magnesium carbonate, held in solution by carbonic acid, causing "temporary" hardness, which can be removed merely by boiling. Rain water, by virtue of its scrubbing action on the atmosphere, absorbs carbon dioxide and other gases, so that when this percolates through earthy strata, it is able to dissolve the carbonates. Also, being a powerful solvent, it takes up chlorides, sulphates, and nitrates of calcium and magnesium—the so-called "permanent" hardness salts—as well as other substances.

Waters derived from peaty areas, although often quite soft, may contain complicated organic acids, even sulphuric acid. Deep well and spring waters frequently have a high "temporary" hardness, particularly if in the vicinity of limestone strata. River and canal waters vary appreciably in different localities and with the changing seasons; they may also be contaminated by effluents from industrial processes.

A town's supply, which in many cases is obtained from lakes or reservoirs, is usually of suitable composition, but the modern tendency to erect power stations away from the towns, in order to secure abundant supplies of water, may leave no alternative but to treat a small proportion of the cooling water for use as make-up.

A water comparatively low in "hardness" is desirable, and this should preferably be of the "temporary" kind, as it is both cheaper and easier to remove. Further, the process does not entail replacing the "temporary" hardness with soluble salts. Suspended matter should be practically absent, chlorides low, and sulphates should predominate for reasons given below.

Scale Formation

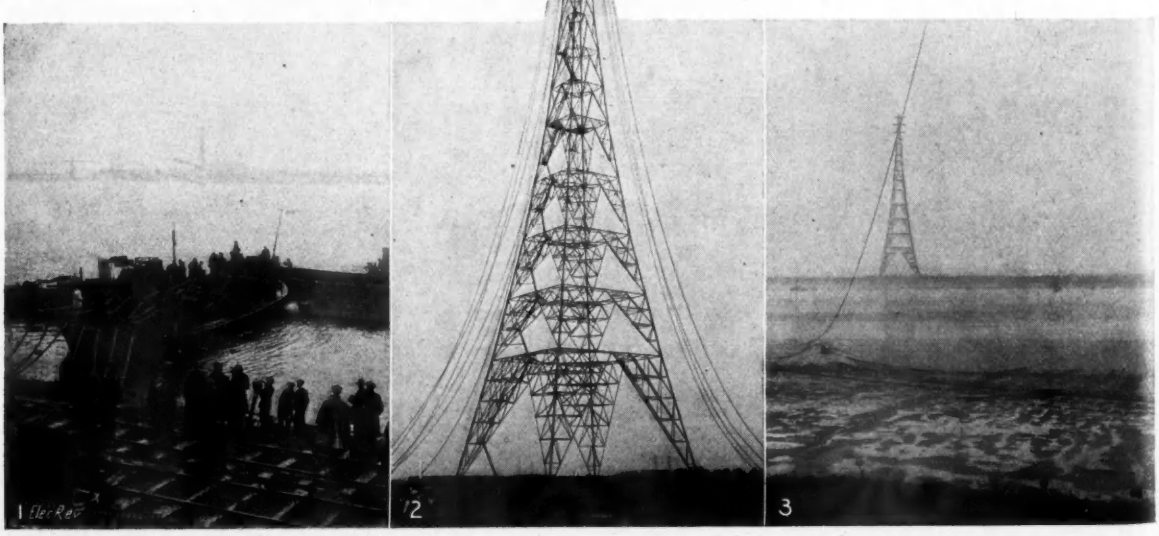
The formation of a hard scale is due to certain salts crystallising out at higher temperatures owing to their much reduced solubility. Calcium sulphate is a case in point, this being deposited preferentially at points where the temperature is highest and this, unfortunately, is at the heating surface.

Investigations in America and elsewhere have shown that such scale is initially due to the evolution of steam bubbles on the heating surface. When these bubbles form, a ring of microscopic crystals is deposited round their edges due to supersaturation, and on bursting there is sudden contact of the boiler water with the slightly overheated surface, which again results in further deposition. Such salts are said to possess a negative solubility coefficient.

Substances of positive solubility coefficient, like calcium carbonate, do not result in supersaturation under the same conditions because the solubility is actually increased with a rise in temperature. Where supersaturation does occur, this takes place at *any* point throughout the whole mass, forming a loose sludge that can be easily blown from the boiler. Thus, when make-up water is softened, or boiler water "conditioned," the hardness salts are converted to these substances of positive solubility coefficients to ensure elimination in a harmless form. "Conditioning" is the treatment of boiler feed in such a way as to precipitate the hardness salts, and the maintenance of suitable ratios between the concentration of certain ions to inhibit secondary effects.

Although calcium and magnesium salts are the worst offenders in the formation of scale, soluble salts, like sodium sulphate, may also give rise to trouble if the concentration of dissolved salts in the boiler water becomes excessive. The particularly hard nature of scale rich in

* Chief Chemist, Barton power station, Manchester.



The Grid Crossing over the Thames: Callender's carrying out a difficult job: 1. The barge leaving the Dagenham side on Sunday last to lay the lines in the Thames. 2. Lines suspended from the Dagenham tower. 3. Hauling up one of the lines on the Woolwich side on Monday morning

calcium sulphate is due to its crystallisation in long interlocked needles—the hardness of cement is due to the same effect. This can be clearly seen under the microscope.

Chemical Analysis

In conditioning water, several chemicals may be used dependent upon the analysis of the water. It is an axiom that this should be alkaline to inhibit corrosion, for which purpose caustic soda or soda ash may be employed. The latter has, of late, been largely superseded by trisodium phosphate. When the steam pressure is between 200 and 250 lb per sq. in., soda ash is unsuitable, as it begins to decompose at the corresponding temperature, resulting in the formation of caustic soda and carbon dioxide. Its disadvantages are an excess of chemical above that theoretically required; the presence of carbon dioxide in the steam; and the need for excessive blowing-down to prevent an undue concentration of caustic soda in the boiler waters. Conditioning with tri-sodium phosphate avoids these, and it definitely eliminates production of sulphate and silicate scale formation if the application is carefully controlled.

Under such treatment calcium phosphate is precipitated in an extremely fine state of division, and samples of boiler water often remain slightly muddy, even after standing for several days. This phenomenon, known as " phosphate haze," seems to be connected with the main disadvantage of the treatment in promoting possible " carry-over " in the steam.

Effects of " Carry-over "

Where " carry-over " takes place deposits are generally found in the superheater or on the turbine blades. Quite apart from the effect of chemical treatment, " carry-over " is influenced by the water level, the rate of evaporation, the velocity of steam in the steam space, and the situation of the off-take pipe. Deposits on turbine blades may also be affected by operating conditions. Machines in constant commission are probably more prone to the trouble, whereas in turbines which stand for some time the deposit will tend to be washed away by condensation on the blades during starting up from cold. The proportion of matter present in the steam under efficient treatment may be exceedingly minute, but the cumulative effect of this after long periods of running may result in an appreciable deposit on the blades.

During recent years a new chemical, sodium aluminate, has been used for conditioning and to aid softening. Where excessive " carry-over " takes place, it is well worth experimenting with such a chemical to flocculate suspended matter in the boiler water. To achieve the best results with aluminate it is important to have a certain amount of magnesium present, as this reacts to produce a highly flocculent precipitate of magnesium aluminate. Sodium aluminate is also useful in the prevention of silicate scales, which are not uncommon where the make-up water has been softened by the lime soda or zeolite processes.

Caustic embrittlement, or the development of fine cracks in boiler steel, is a defect which can occur in highly stressed areas and is influenced by a high caustic alkalinity in the boiler water. The trouble has been more common in America than in England, and most of the research and recommendations emanate from the former country. Parr and Straub found that sulphates and phosphates have the effect of inhibiting embrittlement, so that it is usual to maintain in the water a definite ratio between the sulphate calculated as sodium sulphate and the alkalinity expressed as sodium carbonate. The following are accepted minimum ratios of sulphate to carbonate for present practice: up to 150 lb. per sq. in., 1; 150 to 250 lb. per sq. in., 2; above 250 lb. per sq. in., 3.

If the ratio is too low the sulphate content of the water can be increased by adding sodium sulphate to the feed. Where the make-up water is excessively alkaline, it is permissible to neutralise some of the alkali with sulphuric acid before the water mixes with the condensate; this also improves the sulphate ratio.

Excluding Oxygen

Water completely deprived of its dissolved air is practically non-corrosive to iron and steel, so that it is now the practice to employ a closed feed system. In open systems the feed water can be deprived of its oxygen by de-aerators situated on the suction side of the feed pump, but in closed systems this is done by passing the make-up, heated to a pre-determined temperature, into the condensers. Some authorities believe that corrosion is directly proportional to the oxygen content of the water, so that as far as possible complete removal should be secured. Although keeping the feed alkaline is important, it would appear as if oxygen removal is the greater insurance against corrosion.

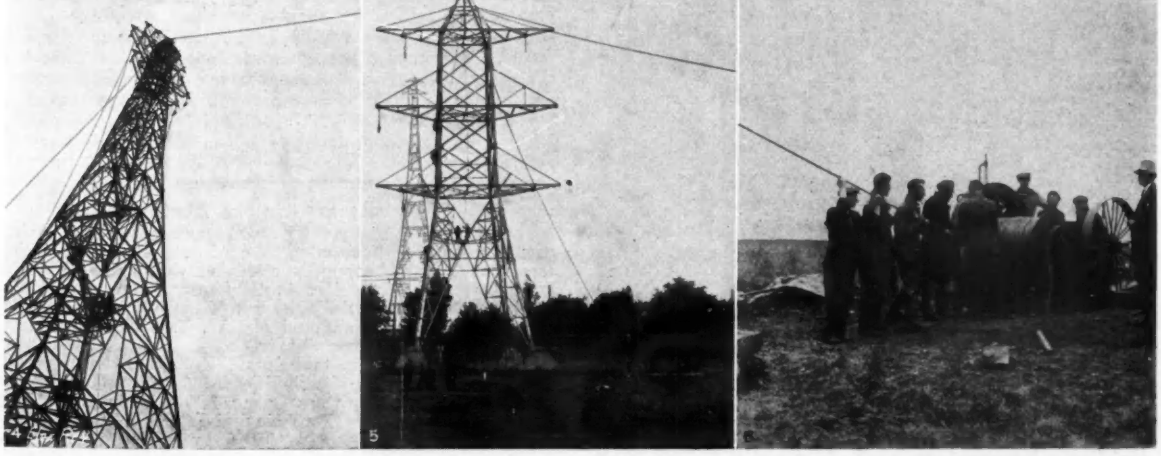
Water possessing a pH value of above 9.6 (*i.e.*, when it is caustically alkaline), is non-corrosive to clean steel, but it is questionable whether a surface which is already pitted will not continue to corrode at the bottom of the cavities, notwithstanding the presence of caustic alkali. On the other hand, oxygen is required as a de-polarising agent, as pithole corrosion is electro-chemical in reaction. A good system of de-aeration will reduce the oxygen content to about 0.05 cu. cm. per litre. Daily tests should be taken by the chemists round the whole feed system from condensers to feed pump discharge. The Winkler test is very useful and sensitive if care is taken to secure absolutely pure chemicals. In sampling, cooling coils may be needed for hot feed water, and a reservoir when drawing water from condensers. The ingenious oxygen recorder introduced by the Cambridge Instrument Co. some years ago has recently been considerably modified and improved.

Chemical Softening

Chemical softening of the make-up to remove lime and magnesium solids before it enters the boiler is preferable to conditioning, and is necessary in some cases. Softening plants can generally be divided into two types, namely, those which rely upon chemical reactions with resultant precipitation of the lime and magnesium as carbonate or hydrates in the form of sludge, and plants in which the water passes through beds of zeolite, which replaces the lime and magnesium salts in the water with sodium carbonate.

Lime and soda or caustic soda are used in the first mentioned; in the second type common salt is used as a revivifying solution. Where temporary hardness is concerned the old Clarke process, utilising lime, is still very largely used.

As heat is almost invariably of assistance in promoting chemical activity, softening processes are more satisfactory if carried out with hot water. This is one of the advantages associated with the " continuous blow-down " system of boiler water treatment. It assists in preventing the accumulation of suspended matter in the boiler, and controls any excessive causticity due to softening the make-up water.



4. Drawing up the lines over the top of the Woolwich tower (487 ft. high). 5. From the top of the main tower the lines pass to an anchor tower. 6. A steam winch hauling up the lines. There are six aluminium-bronze wires with a cadmium-copper core; their overall diameter is 0.918 in., and there is also an earth conductor.

Lighting Service

Extensions at the E.L.M.A. Bureau

THE Lighting Service Bureau, as Mr. W. Sully (director, the Electric Lamp Manufacturers' Association) reminded us the other day, has been in existence for seven years. During that period it has carried out some valuable propaganda, co-ordinated existing efforts, and provided new technical data. Much of the recent remarkable improvement in the art of illumination may be traced to its influence, some of which has found a channel in the twenty-four courses of lectures that it has arranged.

The Bureau starts the second seven years of its life with the advantage of 50 per cent. increased accommodation, as some of the adjoining rooms at the back of the Institution of Electrical Engineers have been taken over from the B.B.C. The entrance, which is now at No. 2, Savoy Hill, is a great improvement on the old, and the modern method of lighting the reception room strikes the right note at the outset. But it is of no use, as Mr. H. A. Lingard (chairman, E.L.M.A. Council) says, having a good front page unless there is something substantial behind it, and the general demonstration room beyond the hall is certainly a notable achievement.

The Central Feature

Probably the most striking feature of the room is the island structure in the middle, which contains several recessed panels.

Another exhibit illustrates the improvement in reading comfort by altering the angle of light rays on to highly glazed paper. Shadow is sometimes necessary, *e.g.*, for the correct illumination of moulded objects; proof of this is furnished by a bas-relief seen under both diffused and directional lighting. A coloured print illuminated by ordinary and daylight lamps indicates the effect of the latter in bringing out the proper colour values.

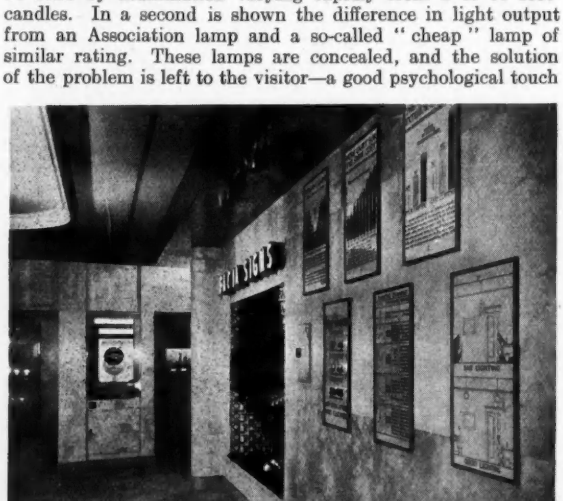
The Effects of Coloured Lighting

The last model on the island shows how the appearance of a coloured picture is entirely transformed when shown, alternately, under red and green light. Round the walls of the room are a number of other attractively arranged exhibits. These include a shop window illuminated with different coloured light continually varied by a motor-driven flasher. The luminous facia sign above the window is also worth particular attention.

In the industrial lighting recess is what we take to be a plea for better train lighting. Two newspapers are displayed in juxtaposition; one is in a state of vibration, and by altering the value of the illumination from ¼ to 40 foot-candles one can see how much more light is required in moving vehicles.

Left: The industrial recess—"reading in the train," light as a magnifier of detail, and a use for daylight lamps. Right: Lighting in the fitting room

In one of these panels a page from a railway time-table can be read by illumination varying rapidly from 2 to 80 foot-candles. In a second is shown the difference in light output from an Association lamp and a so-called "cheap" lamp of similar rating. These lamps are concealed, and the solution of the problem is left to the visitor—a good psychological touch



A display demonstrating the advantages of correct and adequate shop lighting

this, which is repeated for the recess containing a pearl and a clear lamp; the latter is important, as we find that many people still believe that the modern pearl lamp gives less light.

Especially noteworthy is the cabinet in which the light thrown on objects comprising intricate details can be varied through a series of stages. The adjoining two cabinets show how useful are daylight lamps in the grading and sorting of a number of industrial commodities.

Two cabinets controlled by outside handles demonstrate how specular reflection can be obviated, also the effects of diffused and reflected lighting when examining highly polished surfaces.

Striking exhibits in the commercial recess are three-mirror lighting for ordinary lamps, flame-sprayed lamps, green-sprayed lamps, and daylight lamps; a luminous doorway—a practical suggestion for shopkeepers; and a cabinet demonstrating the advantages of daylight lamps in colour matching.

The demonstration room also includes a cabinet showing the range of standard lamps and their consumptions; a collection of early electric lamps representing the Foggo collection (the gift of Messrs. H. A. Lingard and J. Y. Fletcher); and a 5-kW lighthouse lamp displayed in contrast with the smallest medical lamps.

Electricity and Smoke Abatement

The electrical industry will be well represented at the annual conference of the National Smoke Abatement Society which meets at Newcastle-upon-Tyne during this week-end. The delegates will include Mr. A. G. Shearer, representing the Institution of Electrical Engineers; Mr. A. Parkin, Electrical Development Association; and Mr. W. T. F. Pinkney, Newcastle-upon-Tyne Electric Supply Co.

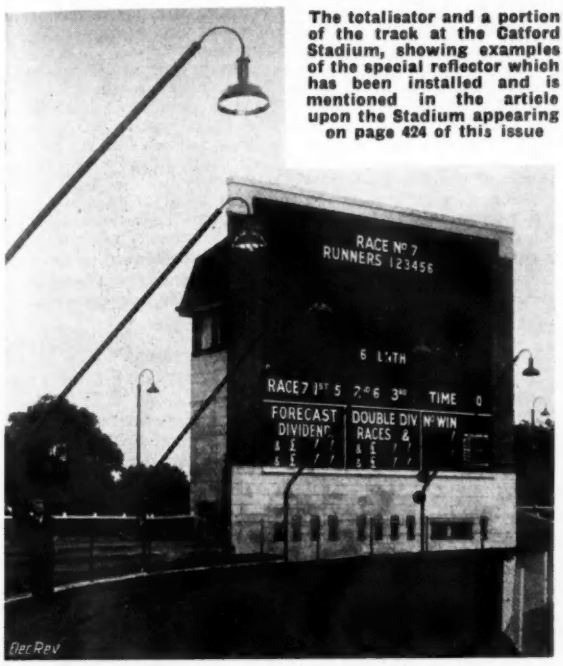
The principal papers to be read include "The Domestic Smoke Problem: The Possibilities of Coke-oven Fuel," by Mr. R. A. Mott, of the Department of Fuel Technology, Sheffield University; "The Psychological Effects of Smoke," by Ald. David Adams, J.P.; and "The Human Element in Smoke Abatement," by Mr. E. A. Crossley, chief smoke inspector, Manchester.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Electric Haulage for Canals

After a long spell of deplorable neglect, the reconstruction of the Grand Junction Canal has focused public opinion upon the revival of our once famous inland waterways, which formed the backbone of our industrial life before the advent of the railways. Mechanical propulsion of barges is not always admissible, as the wash they produce is detrimental to the earthen banks of the older and narrow canals. Haulage by locomotives running along the tow path is employed on long sections of some of the busiest Continental canals. In France, locomotive traction is in use on about 450 miles of inland waterways, and another 250 miles is being similarly equipped.



The totalisator and a portion of the track at the Catford Stadium, showing examples of the special reflector which has been installed and is mentioned in the article upon the Stadium appearing on page 424 of this issue

Among the most important German canals equipped for electric traction are the Finnow and the Teltow Canals, providing direct connections between Berlin and the Baltic (Stettin) and the North Sea (Hamburg), respectively, and the Rhine-Berne Canal. On the latter and on the Finnow Canal the locomotives are employed for the rapid introduction and withdrawal of the barges into and from the canal locks. The gauge of the track varies from 2 ft. to 3 ft. 3⅜ in., the rails weighing about 40 lb. per yd. Electricity is collected from an overhead trolley wire, the suspension of which is somewhat similar to that adopted for railless electric buses. The height of the trolley wire above the rails varies from about 16 ft. in the open country to less than 9 ft. under low bridges.

The locomotives are usually of the four-wheeled tractor type with the driver's cab arranged either at one end or centrally. Their centre of gravity is low in order to counteract the tilting moment set up by the lateral pull of the haulage rope. The correct tension of the latter at varying speeds of the barge and locomotive respectively is obtained by an automatically controlled purchase gear. A pair of traction-type motors of an average output of from 5 to 10 h.p. each is usually installed. The locomotive axles are driven through a single or double-reduction gear giving a speed of from two to three miles per hour, the pull on the haulage rope or cable amounting to about 1,800 lb.

It may be that the cheap rates offered for electricity taken during the night hours or other "off-peak" periods would favour the employment of storage-battery locomotives for this work. The greater weight of accumulator locomotives would tend to increase their stability, and the elimination of the overhead trolley wire would simplify the system; sub-stations, which at present are distributed at intervals of about twelve miles, would be restricted to a few charging points. I believe that the mechanisation of canal traffic offers considerable opportunities to the manufacturers of small locomotives, and I consider that the home market thus presenting itself is worthy of the closest investigation. As a guide to the probable number of locomotives required, it may be mentioned that on the electrified section (about eighty miles long) of the Rhine-Rhône canal over forty locomotives have been put into service during the past few years—an average of one locomotive for every two miles.

RODERICK HEDLEY.

London, S.E.19, *September 19th.*

Dangerous Wiring

I was deeply interested in your correspondent "C.B.'s" criticism of cheap and dangerous wiring in the current issue of the REVIEW, but what can he expect when there are so many youths nowadays getting a smattering of electrical knowledge in the day and night schools, and are considered smart lads by their fond parents and relatives? It is they who do these small jobs out of their pocket money and in their spare time.

When one is canvassing for contract work one is met by the assertion that a son or cousin or nephew will do it much cheaper, as he is quite a smart lad. Again, we will be told that any fool can run a few wires round a house.

There is another class of workman which perhaps your correspondent has forgotten; he is the man who runs some other class of business and adopts electric lighting and wireless as another sideline. These employ youthful assistants to do the work at the very lowest possible price.

There are other factors, of course, too numerous to mention here but the root of the whole trouble is a desire for cheapness without regard to the consequences.

OUT OF WORK.

Sept. 16th.

"Pettifogging Localism"

The recent proposal of a certain political party to introduce a Bill controlling the distribution of electricity in the event of their return to power as the Government of this country should be of the greatest interest to all connected with the electrical industry, as well as those unfortunate members of the community who are at present unable to enjoy the benefits of a supply for such reasons as a lack of enterprise in an undertaking, excessive profit-making concerns (fortunately rare), or "pettifogging localism" on the part of municipal undertakings.

As to anomalies I give two instances. The first is a little town of 5,000 inhabitants in S. Devon; electricity is supplied by a private company with up-to-date, well-appointed showrooms in the main thoroughfare. Demonstrations of electric cooking are given every Wednesday afternoon, and services are laid free up to 60 ft. The all-in rate for lighting and heating is 1½d. per kWh plus a charge calculated according to floor area.

The floodlighted exterior of the Sheffield City Hall **(see p. 423)**

The second is a borough (not 100 miles north of the first city in the Empire) with nearly 100,000 inhabitants. The showrooms are at the extreme end of the borough in a road used

by few people. A representative also attends for three hours twice a week at an office in the main street which is normally used for the collection of rates and electric light accounts. The appearance of this place reminds one of a police court, and it would disgrace any railway company if used as a booking office. There is a heavy service charge and a minimum quarterly charge. The heating flat rate is 2d. per kWh, and there is a cheap rate of 4s. per kW of installed appliances plus ¾d. per kWh for all current consumed.

If any borough with a beautiful swimming pond and playing fields, which are more often than not monopolised by "outsiders," thought as much of the health of its residents as it professes to do, why should it not make electricity supply available to all its residents? They cannot all have pounds to spare for the Council's service charge, and anyway the Council ensures adequate revenue by its minimum charge.

I wish every success to any organisation that has the will and power to deliver us from "pettifogging localism" and extend electricity supply. No one else has been able to help.

September 19th. HORNSEY, N.8.

A Supply Engineer's Inquiry

I am anxious to know if any supply authority has on its mains a hospital of 20-40 beds capacity that has adopted electricity for heating, water heating, radiography, sterilising and cooking, as well as lighting. H. G. MIDDLETON.

Brentwood District Electric Co., Ltd.

Brentwood, *September 20th.*

"I Beg to Apply . . ."

Perhaps I may be permitted to express my views on this subject, although I am a very small potato in the electrical field.

I am forty-six years of age, a trained craftsman accustomed to all kinds of wiring work, and have had plenty of experience in diagnosing and removing troubles in a.c. and d.c. motors and control gear. I have also done a good deal of traction armature rewinding and have acted as foreman over forty men on high class installation jobs. I am equally familiar with automobile electrical equipment. Thus I can describe myself as an electrician with thirty years' varied experience.

I have been unemployed for over a year and during that time I have answered fourteen advertisements in the ELECTRICAL REVIEW of jobs for which I considered myself suitable. I have tried every kind of application I could think of. In no case have I received the courtesy of a reply, not even an acknowledgment of an application, although in a few cases I sent stamped addressed envelopes. Worse than this! Not one of these fourteen advertisers had the elementary sense of decency to make use of the facilities provided *free* by the ELECTRICAL REVIEW to notify unsuccessful applicants that "the position is now filled."

I would like to offer a few suggestions to advertisers such as the following:—

1. State clearly what the job is. (Many of you do not, you know.)
2. If you must conceal your identity by a box number, at least give some indication of your locality. It is obviously a waste of his own time and of yours for a workman living in Aberdeen to apply for a job in London.
3. State what you are willing to pay or at least refrain from asking the applicant to "state wages required."
4. If you have an age limit in your mind, say what it is.
5. Realise that you are under an obligation to reply to every applicant who answers your advertisement. If you cannot send the unsuccessful applicant a letter or even a printed expression of thanks and notification that his application is unsuccessful you might at least insert a notice in the paper in which your advertisement appeared.

I conclude by hoping that through improvement in your unsatisfactory advertisements and my unsatisfactory applications I may some day in the not-too-distant future be able to subscribe myself, YOUR OBEDIENT SERVANT.

Ayr, *Sept. 20th.*

Cheaper Gas at Rotherham

With reference to the report that has appeared in the Press regarding the proposed reduction in price of gas in Rotherham from 3s. to 10d. per 1,000 cu. ft., the explanation is that there are coke ovens not very far from the centre of Rotherham with a considerable amount of surplus gas available which is sold to the Corporation gas undertaking at something like 6d. per 1,000 ft.

The gas undertaking is at the present time experimenting with a two-rate system on Corporation housing estates with standing charges varying from 9d. to 2s. per week, plus 10d. per 1,000 cu. ft. of gas. It is not intended to interfere with the electric lighting of any of these houses.

EDWARD CROSS,
Engineer and General Manager,
Corporation Electricity Dept.

Rotherham,
September 20th.

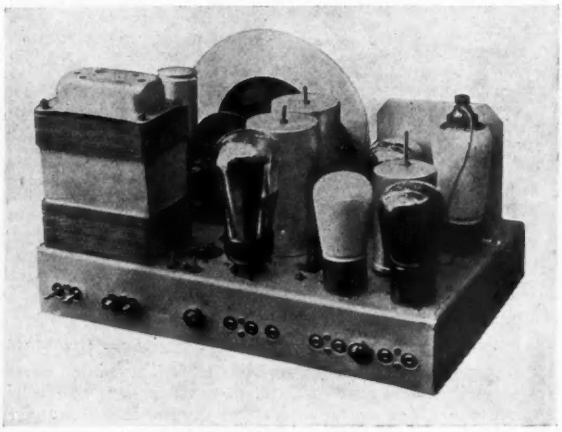
Paris Radio Exhibitions

TWO radio exhibitions are being held in Paris. One is in the Salon de T.S.F.; the other is the International Wireless Exhibition.

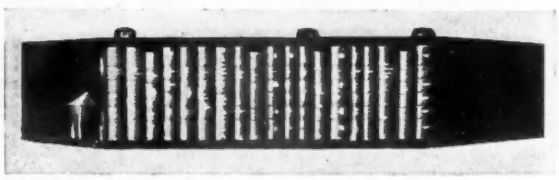
The former show is held at the Grand Palais and attracts the best French makers and also several foreign exhibitors; the latter, this year, are very few, owing to the recent quota, and there are no British exhibitors because French makers are not allowed to show at Olympia.

Among the foreigners American manufacturers are most prominent, especially the French agents of American houses, such as Mazda, Thomson-Houston, and the Matériel Téléphonique. Other American concerns include the American Radio Corporation, and Jackson Radio.

As regards the lay-out of the show, and the design of many of the sets, this year's exhibition is splendid, but the technical side appears to have been rather neglected. Most sets are small, and differ in that respect from those shown during the past few years. There is a demand for the compact portable set. An interesting exhibit is that of the Philips organisation, which includes two new sets, the "830" and "630," four-circuit super-inductance sets. These embody some novel features in the winding of the coils, and the condensers are smaller and of an improved type. The electrical loss in the coils is reduced by the use of glass supports. The copper loss is easily ascertainable and can be reduced at will. Many theoretically perfect coils, after exposure to the air for several hours, absorb so much moisture that the losses reach enormous proportions. The new super-inductance coils are protected against this by the glass supports and by an enamelled winding impregnated during manufacture with a non-hygroscopic material.



The "Gody" receiving set



A "Radiomuse" set concealed in a bookshelf

What is possibly the best-looking apparatus is the "Miracle," made by Radio-Lyon. Their sets are small and have an electric clock mounted on them. Only two or three sets shown have this little extra attraction. The set itself is suitable for d.c. or a.c. at 100, 110, 130 or 220 V; the names of the stations and their wave-lengths are indicated on the dial of the set. The same idea has also been included in the Gody sets which are extremely simple to control. One button or knob controls the power and changes from long to short waves, the dial being lighted with a red lamp for short waves and a green for long waves. The dial also gives the names of the stations.

At the International Salon even fewer foreign exhibitors are to be seen, although Cossor valves has a stand, being the only English exhibit. The American Crosley Company has a rather good show, and claims that an English user of one of its twelve-valve sets, just outside Paris, received the Harmsworth Trophy report from America, whereas the B.B.C. failed to do so because of the bad weather. "Radiomuse" shows a little originality by exhibiting a set in a dummy bookshelf.

Both shows have television sections, the Salon giving special demonstrations daily. There are only two exhibitors, Bonvoism being the more important with a new set which projects the pictures on to a screen by means of mirrors. This set is offered at 2,000 fr. There is also a special room where photo-electric cells operate a buzzer every time anybody passes through the door, and the number of persons entering is registered.

New Apparatus and Devices

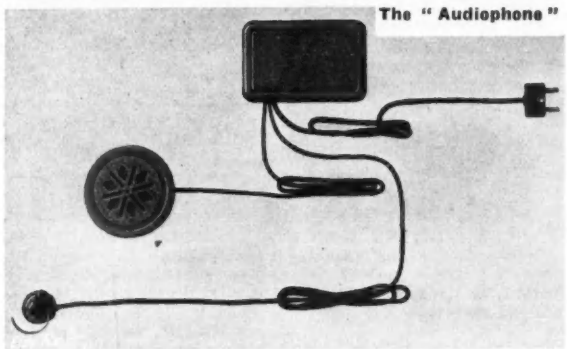
for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

An Aid to the Deaf

The main components of the "Audiophone," which has been produced by the WESTERN ELECTRIC CO., LTD., Bush House, Aldwych, W.C.2, are a miniature microphone and a small valveless amplifier. The microphone is of the variable resistance type and is essentially the same as a telephone carbon transmitter. Provision has been made to secure uniform contact pressure on the carbon granules, to prevent ageing of the carbon, and to compensate for temperature changes. The valveless amplifier is designed to increase the output from the transmitter by about 20 decibels, which is equivalent to one ordinary stage of valve amplification.

The output from the microphone passes through the winding of the amplifier receiver, setting up a magnetic field that moves a "Permalloy" diaphragm. The latter drives a carbon diaphragm of similar dimensions through an air coupling formed by the narrow intervening space. The carbon diaphragm acts on the granular carbon, as does the diaphragm of a transmitter, and thus produces amplification. One battery supplies current for both transmitter and amplifier. The circuit is completed by an electro-magnetic receiver. The price of this model (37A) is £22.

Two types of earpieces are supplied; the "Universal" is adjustable to meet the important aural dimensions; "the made to measure," or the moulded type, fits snugly into the



The "Audiophone"

ear. The microphone, which has a diameter of less than 2½ in., can be attached to the coat lapel, and the amplifier, which is smaller than a cigarette case, can be placed in the vest pocket. Another model is available (No. 38A) at the same price; in this the microphone and amplifier are contained in one small case. A cheaper model without amplifier is available at £12.

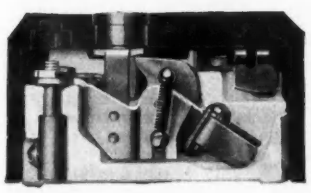
An Unusual Bulkhead Fitting

A bulkhead fitting which may be recommended for the lighting of public baths, subways, &c., was introduced recently by SIMPLEX CONDUITS, LTD., Garrison Lane, Birmingham. It is designed expressly for ceiling suspension from an ordinary conduit box. The body is made of copper and can be supplied in various finishes. It is fitted with a watertight gasket and a substantial guard, and the simplicity of fixing is probably its most outstanding feature; it is directly connected to the conduit run and thus becomes an integral part of the system.

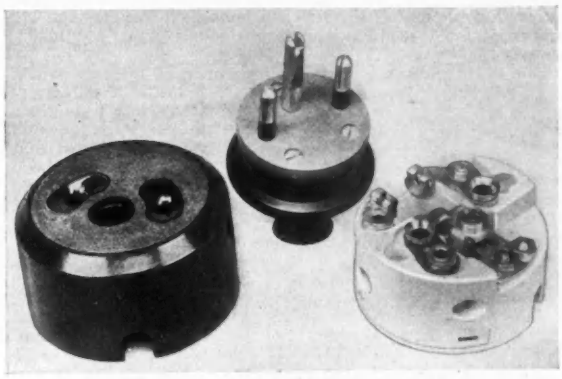
The "Simplex" ceiling bulkhead fitting

An Earth-pin-operated Switch-plug

The "Wandsworth" switch-plug recently introduced by the WANDSWORTH ELECTRICAL MFG. CO., LTD., Imperial Works, Kenyon Street, Birmingham, is a new 10-A interlocked combination switchplug with automatic action. The cover is of new design and is secured by a single fixing, a visible earthed nut. The two current-carrying pins are shielded and the switch, which is of the quick-make and-break type, is operated by the earth pin as it is pulled out or pushed in. The end of the contact arm of the switch is shielded and moves upwards to its contact. The prices are 5s. 4d., with a flat plug or 5s. 8d. with a handshield plug. The device can be obtained in flush, workshop, watertight and



The switch movement



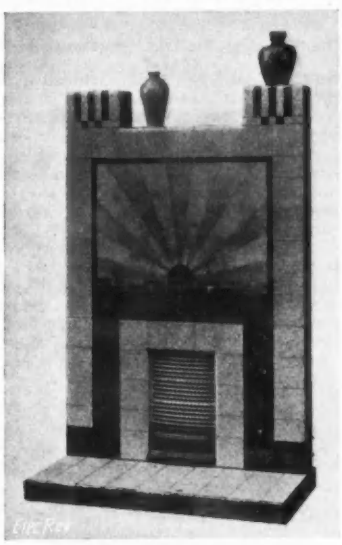
A switch-plug with earth-pin operation

gastight patterns and a 20-A size is also being produced.

A Complete Electric Fireplace

In the new faïence and tile fireplace introduced by the BELL FIREPLACE CO., Kingswell Works, Northampton, the fire itself is built in with the tiled surround, the whole being in one unit ready for fixing, if desired, against a flat wall. Where the fireplace is fitted to a chimney opening, free ventilation is obtained by the faïence ventilating fret. Convected heat is afforded by air rising at the back of the fire from the element bars and passing through the perforated faïence air duct. The element bars, complete with their sub-frame, can be quickly removed from the front.

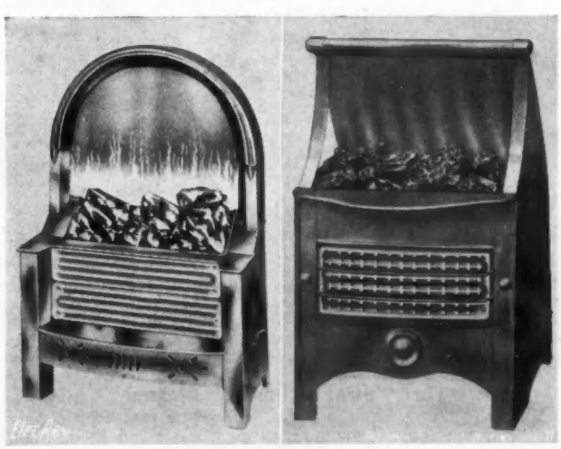
Tucker foot-press switches fitted on the return end of the mantel operate two bars, the centre bar being connected direct. The flexible connection to the terminal block passes under the one-piece raised hearth. An entire absence of exposed metalwork is a distinctive feature of the design.



A built-in electric fire

Siemens's Fires

There are two new models in the "Cosyglo" range of SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4. These introduce a new type of imitation fuel with a more realistic effect. A 1-kW "Cosyglo" at £2, finished in sprayed oxidised silver, is suitable for dainty surroundings, while a larger 2-kW model with considerably increased ornamentation and graceful curves may be purchased for £3 7s. 6d.



Two new "Cosyglo" fires

An Important Cooker Development

The entry of the ENGLISH ELECTRIC CO., LTD., Stafford, into the domestic field was marked a few months ago by the issue of full information regarding a new range of fires to supply undertakings and the trade. Particulars have now been received of the first of the series of household cookers that will comprise small, medium and large models of a " de luxe " series.

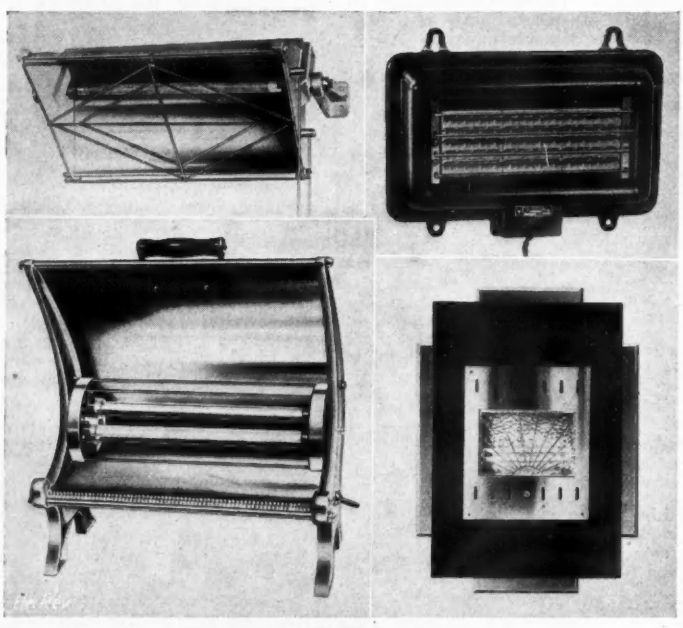
The medium model contains a number of features which indicate that careful study has been given to every detail, and we are informed that this cooker has been tested under practical conditions over a long period before finally being put into production in the factory. Like the fires, the new cookers are being manufactured at the company's Bradford works.

The " English Electric " medium-sized cooker

Ease of cleaning and avoidance of all material that is liable to be acted upon by fumes or steam are points that will undoubtedly appeal to the housewife. Moreover, the cookers are very compact and free from all projections or sharp corners. The inside of the oven, like the cooker generally, is finished in hard vitreous enamel, and it is constructed and fitted so that no steam can find its way into the lagging chamber. Side and bottom heating is provided, and the elements are metal-cased units of the plug-in type which are easily removed when necessary, but when in position give complete protection to the connections and their supports. The space between the top of the oven and the cooker top forms a roomy plate-warming chamber fitted with a drop-down door.

The cooker top is equipped with a griller hot plate of the plug-in pattern, and one or two hot plates of the embedded plug-in type. The oven, grill and hot plates are all provided with three-heat control, and particular care has been taken to arrange the grill elements so that uniform heating is obtained with the control switch in any of the three positions.

Access to the hot plates and to the warming chamber for cleaning purposes is obtained by raising the hinged hob to the vertical position where it is held by an automatic catch. The overall dimensions of the medium " de luxe " cooker are 24¼ in. wide by 23¾ in. deep by 37¾ in. high, with an oven capacity of 3,000 cu. in. The company's small and large models of the same series will also be available very shortly.



Four new " Ediswan " fires

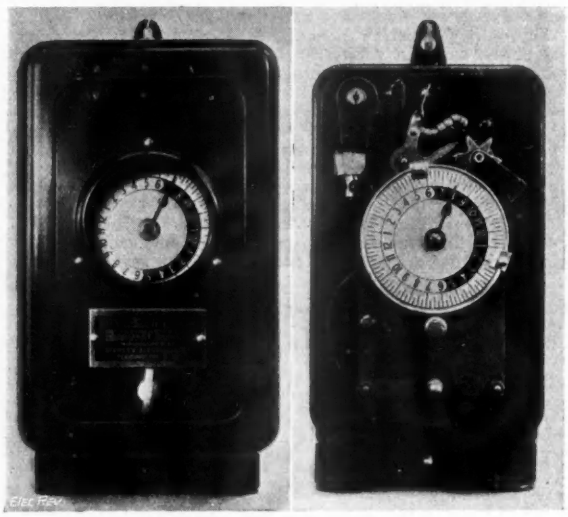
The " Siroma-Super " Cleaner

Messrs. ARTHUR MORRIS & Co. inform us that they supply the " Siroma-Super " vacuum cleaner, described in our last issue, only through wholesale channels at the stated price of £7 7s.

A " Bakelite " Time Switch

A time switch especially suitable for shop-window and street lighting and illuminated signs has recently been introduced by the STANLEY ELECTRICAL CO., Latimer Works, Teddington, Middlesex. The case, lid and base are moulded in black " Bakelite." The lid is hinged and so provides easy and safe access for winding and setting. A new type of terminal enables the cable to be inserted easily when wiring up.

The high-grade hand-wound clock movement is thirty-hour as standard, but an eight-day movement can be fitted if required. There are definite make and break switch operations, and the contact springs are of the controller rotary type, with heavy contacts of gold and silver alloy. A flash coil reduces sparking, and an insulating shield covers the mechanism. Simplicity of operation, accurate time-keeping, and reliability are features of the two models for 250-V, 5 A, a.c. and d.c. The price of each type is 36s.



The " Stanley " time switch

A Variety of New Fires

There are a number of additions to the range of fires marketed by the EDISON SWAN ELECTRIC CO., LTD., 123-5, Queen Victoria Street, E.C.4. Green, red and brown enamel 11-in. pedestal fires (600 W) with coppered reflectors are available at 15s., while a blue enamel model with a chromium-plated reflector costs 17s. 6d. A bath heater in chromium-plating finish or aluminium is available at £2 2s. 6d. Loaded at 1 kW it is specially designed for wall or ceiling mounting and it can be swivelled at any angle by hanging adjusting cords.

A 1-kW wall heater for use in ships, hospitals, &c., is fitted with a flat-bar element in black enamel listed at £1 2s. 6d., and in white enamel at £1 12s. 6d.

The 750-W " New Junior " is a handy flat-bar fire made of pressed sheet metal and fitted with a trivet for food warming. In stove black enamel it costs 16s., and in green or blue enamel 18s. 6d. The " Popular " is substantially constructed in pressed sheet metal and fitted with an insulated drop-down handle. The 1-kW model costs 18s. 6d. in stove black enamel, and with vitreous enamel finishes the 2-kW model is available at £1 10s.

" Inset " 2-kW fires are available in both the permanent and non-permanent types. The former is for mounting flush with walls and is fitted with new type clamp-in elements. Finished in chromium plate it costs £3 12s. 6d. In similar finish the non-permanent model (£3 10s.) is also similar in design and is suitable for fixing in existing fire-places without the necessity of structural alterations.

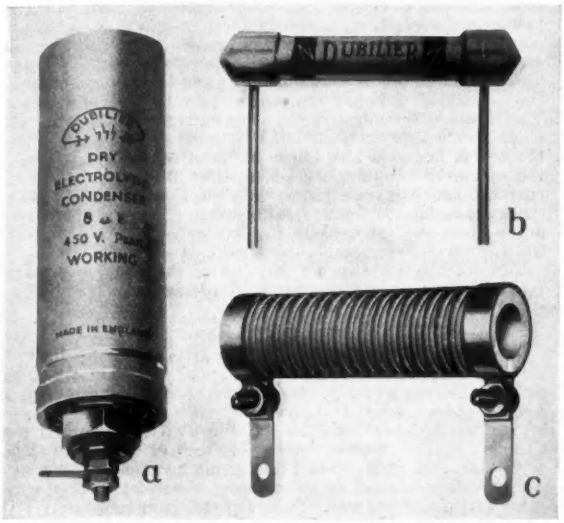
The 2-kW " Victor " (£2 10s.) is an attractive fire constructed on simple lines. It has a bright smooth chromium reflector and cast ornamental end plates finished in sprayed oxidised silver

Radio Accessories

Among the equipment recently introduced by the DUBILIER CONDENSER CO. (1925), LTD., Victoria Road, North Acton, W.3, are a high-voltage electrolytic condenser, metalised grid leaks and " Spirohm " resistances. The condenser is of the dry type and is designed as a smoothing unit for rectifier, filter and decoupling circuits, and it is suitable for any case where there is a polarising d.c. voltage which, with the addition of any alternating or ripple voltage, is below the specified maximum safe peak voltage for the condenser.

It consists of positive and negative electrodes with a separator impregnated with an electrolyte, the whole being mounted inside a sealed aluminium container fitted with a moulded

terminal insulator. The metal container forms the negative terminal, and the terminal bushing is fitted with a large nut for mounting the condenser through a hole in a baseboard. With this arrangement the negative connection is made automatically to the baseboard, and the connections to the positive terminal are taken beneath the baseboard. The electrolyte is free from water; the power factor is about eight per cent; the leakage is very low; and if it is subjected to a transient over-voltage it reforms on restoration of the normal



New Dubilier products: (a) high-voltage electrolytic condenser; (b) metallised grid leak; (c) "Spirohm" resistance

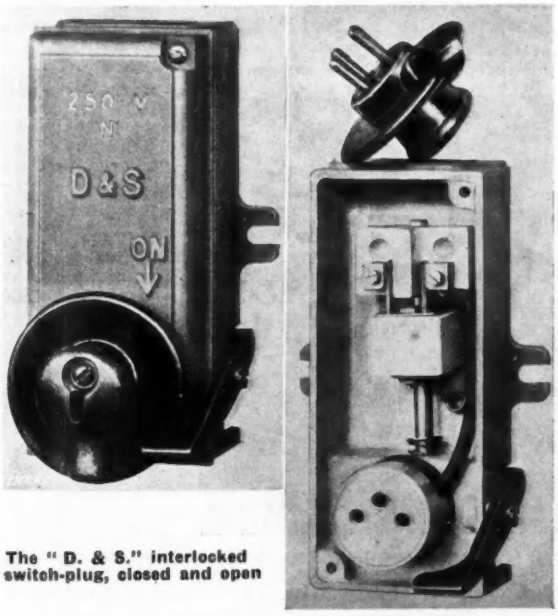
current. It is designed for a maximum peak voltage (d.c. and a.c.) of 450. There are three capacities—4 mF (4s. 6d.), 6 mF (5s.), and 8 mF (5s. 6d.).

The metallised grid leaks are of the same construction as the company's ordinary metallised resistances, and they are available in eight standard sizes of from 0.25 megohms to 10 megohms, all at 1s. each.

The "Spirohm" resistances are wire wound and can be loaded to 10 W. There are ten models varying from 200 ohms and 200 mA to 50,000 ohms and 10 mA at from 3s. to 5s. each. The resistances can be adjusted accurately to the specified value, and intermediate tappings can be provided with extra clips. Intermediate values can be supplied with the same current-carrying capacities as the next higher standard values.

A Small Interlocked Switch Plug

A few weeks ago we illustrated a new quick-break, sliding-type switch which had been provisionally patented by Messrs. DORMAN & SMITH, LTD., Salford. This switch has now been incorporated in a small interlocked switch-plug, which is just about to be placed on the market. The manufacturers claim

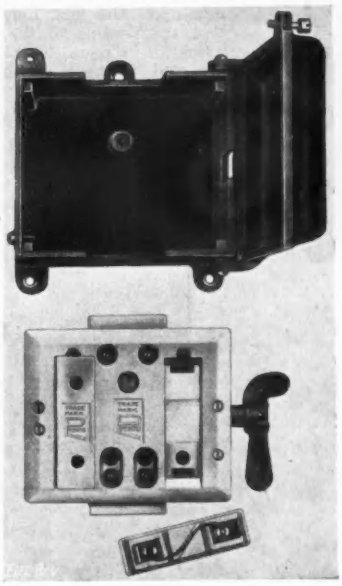


The "D. & S." interlocked switch-plug, closed and open

that the ample area of the switch blades, designed to give pressure contact, the speed of break, and the care taken in the manufacture of the plugs and sockets, ensure that this switch-plug will give long and useful service.

A Fool-proof Switch-fuse

The "Newera" switch-fuse recently introduced by PRENTICE, LTD., Low Hall Mills, Holbeck, Leeds, is claimed by the makers to be entirely "fool-proof." All the live parts and mechanical movements are assembled on the back of the removable British china block. The movement is of the makers' timing claw and one-piece cam fitted to a laminated insulated bar carrying the moving arms without metal support, thus eliminating breakdown to earth. When the lid is open or the fuses are withdrawn there are no live parts which can be touched, and the switch must be in the "off" position when the cover is open. The china unit is secured by one screw only, and it can be sealed at the works if required. Top and bottom entries are arranged for, and conduit glands can be supplied as extras.

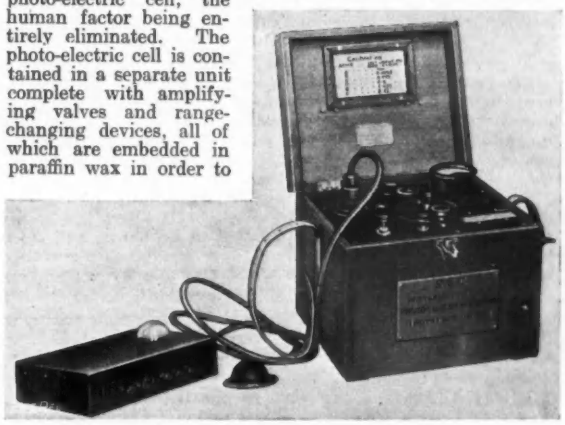


The "Newera" switch-fuse

The rating is 10 A at 200 V; the size 5½ by 4½ by 3 in.; and the price 4s. each in quantities of four dozen.

The Measurement of Illumination

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has developed a portable photo-electric photometer for the precise measurement of illumination by means of an Osram photo-electric cell, the human factor being entirely eliminated. The photo-electric cell is contained in a separate unit complete with amplifying valves and range-changing devices, all of which are embedded in paraffin wax in order to



The G.E.C. portable photometer

secure the high insulation necessary. The metal containing box screens the amplifier from external electrical disturbances. Measurements are made by adjusting a potentiometer until the galvanometer deflection is zero, which indicates that the valve bridge is balanced. The potentiometer reading multiplied by the calibration factor gives the illumination value.

Small Moving-iron Instruments

To meet the demand for a robust and reliable measuring instrument of low price and small size MESSRS. ERSKINE HEAP & CO., LTD., Caroline Street, Broughton, Manchester, have introduced a range of circular 2½-in. scale moving-iron instruments for a.c. and d.c. They have spring control and external zero adjustments. The design is similar to that of the makers' 4-in. square and 6-in. and 8-in. round meters, and includes sapphire jewel bearings. The movement is well damped and the finish is of a high class. The accuracy is first-grade to British Standard Specification No. 89, when used on a.c. circuits at up to 100 cycles per second. Instruments for up to 100 A at 200 V cost 25s., and others from 260 V to 600 V, with external resistances, cost 37s. 6d.

A small m.i. ammeter

Measuring Reactive Power.

By G. W. Stubbings, B.Sc., A.M.I.E.E.

THE two-wattmeter method of measuring reactive power depends upon the fact that $\sqrt{3}$ times the difference between the reading of the two wattmeters used for power determination is equal to the reactive volt-amperes, if both currents and voltages in the circuit are accurately balanced. An expression for the circuit power factor can thus be obtained in terms of the ratio of the readings of the two wattmeters.

Although the derivation of the power from the sum of the wattmeter readings is legitimate, irrespective of the balance of the circuit, this not not the case with regard to the calculation of reactive volt amperes. The method referred to has

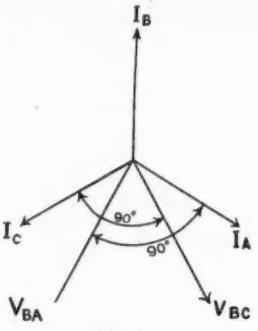


Fig. 1

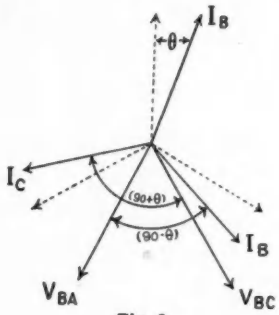


Fig. 2

also often been suggested as a convenient means of measuring the reactive energy taken by power consumers when the price per kW depends upon the consumer's power factor, and here also the requirement of a strict balance in the three-phase circuit has often been overlooked.

In this investigation we shall make use of the modern conception of the symmetrical components of an unbalanced three-phase circuit and specify the amount of unbalance in terms of the ratio of the negative-sequence component to the positive-sequence component of the current system.

Unbalanced Currents

Let us consider a three-phase circuit in which the voltages are symmetrical, but in which the currents are unbalanced, due to the presence of a negative sequence component, the magnitude of which is K times that of the positive sequence component I. We may consider the association of each of these components with the meter voltages separately.

Since the components are, by definition, symmetrical, the difference in the readings of the two wattmeters due to the positive sequence component is equal to IV sin ϕ, and since, with a balanced voltage system, only the positive-sequence-system can carry reactive power measurable by wattmeters, this value is equal to $1\sqrt{3}$ times the correct value of the reactive power in the circuit.

The effect of the negative-sequence component on the wattmeter readings is shown by the accompanying vector diagrams. In fig. 1 we have the vectors of a negative-sequence system, the B-phase current of which is in phase with the corresponding positive-sequence current. There is a 90 deg. phase difference between each other current and the wattmeter voltage with which it is associated.

In fig. 2 we have a phase difference, θ, between the positive and negative-sequence currents identified with B phase. The phase differences between the B and C phase currents and the associated voltages are respectively $(90+\theta)$ and $(90-\theta)$. The effects of the negative-sequence currents on the wattmeter readings are thus each numerically equal to KIV sin θ, but as the one is negative and the other positive, they cancel when the wattmeter readings are added, since the negative-sequence currents can carry no power in association with a positive-sequence voltage system. The difference of the wattmeter reading is, however, affected to the extent represented by 2KIV sin θ, due to the negative-sequence component.

The difference between the value of the reactive power as obtained from the wattmeter readings and the true value is thus $2\sqrt{3}$ KIV sin θ.

Amount of Error

The fractional error is obtained by dividing this quantity by the true value of the reactive power, viz., $\sqrt{3}$IV sin ϕ, and this error is 2K sin θ/sin ϕ. The value of the angle θ depends upon the phase angle of the positive-sequence component ϕ, and also upon the phase relation of the two symmetrical components. The greatest value of the error occurs when $\theta=90$ deg. and sin $\theta=1$, and this greatest value is 2K/sin ϕ.

The value obtained is in terms of the ratio K of the two symmetrical components. To interpret this in terms of unequal line currents we must correlate K with these values. Let the values of the three line currents be in the ratio $1:(1+m):(1+n)$, m and n being the fraction differences of one of these currents from the other two. It can be shown by elementary geometry that if m and n are both small,

$$K^2=4/3(m^2+n^2-mn).$$

Thus if the three line currents are in the ratio 100 : 101 : 102, the values of m and n are respectively 0.01 and 0.02 and the value of K is found to be 2.0 per cent. The maximum error in the determination of the reactive power by the two-wattmeter method (power factor 0.71) will be $\pm 2\times 2/0.71=5.7$ per cent.

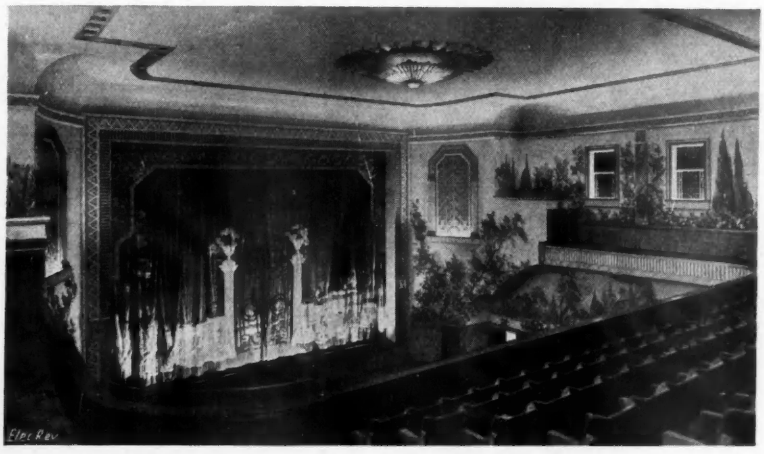
A circuit in which the maximum difference between any two of the currents did not exceed two per cent. is one in which the unbalance would be very difficult to detect, except in the laboratory, and which would, in commercial practice, be considered to be very approximately balanced. The calculation given above shows that even with a small departure from accurate balance the possible error is over five and a half per cent., and that the two-wattmeter method is quite untrustworthy for the measurement of reactive kVAh in a consumer's supply, even if the load be nominally balanced.

Cinema Lighting at Birmingham

LIGHTING plays a big part in the decorative scheme at the Grove Cinema, Birmingham. The interior of the auditorium, which seats 1,612 people, is finished with "atmospheric decoration" to convey the illusion of panoramic views, and the electric lighting work has been planned to harmonise with the architecture and to display the mural paintings to advantage.

The main auditorium and the balcony are lighted principally from window boxes and two wall urns, in which are arranged thirty-eight asymmetrical mirror glass reflectors, each urn being equipped with a 150-W lamp. These urns serve to direct the light upward towards the ceiling, whence it is diffused downwards. Additional lighting in the main auditorium is provided by four special trough projector units above the balcony exit doors behind silhouette tree decorations. Two large circular glass panel fittings on the ceiling are also employed.

Under the gallery four flush box panel fittings are arranged on the ceiling with augmented cornice lighting units around the wall. The screen and curtain are lighted by means of eleven parabolic troughs arranged along the apron of the stage and equipped with coloured glass lenses. Modernistic fittings of panel glass are used to light the vestibules, staircases and lounge hall, the effect in the main entrance being particularly attractive and comprising lamps arranged behind the glass ornamental trough in the shape of a false cornice. The centre part of the façade is floodlighted by asymmetrical projectors with a total load of 3,000 W.



Illumination adapted to architectural features in the Grove Cinema

The Edison Swan Electric Co., Ltd., were responsible for supplying the fittings for the screen and curtain, for the architectural lighting in the auditorium, and for the floodlighting of the façade, in addition to the exit sign, stationary battery for the emergency lighting and cables. The lighting installation was designed and carried out by Messrs. Sydney R. Hare & Son, Ltd., Birmingham.

Avoiding Accidents. By J. W. Thomas, LL.B., B.Sc., Barrister-at-Law

The employé's safety is the law's first consideration

FROM time to time since the beginning of the last century laws have been passed designed to safeguard the health of employés and to protect them against danger arising out of their occupation. The first dates back to 1802, when a statute was passed to protect apprentices in cotton mills. After that date several Acts dealing with hours of labour and the safety of workmen were placed upon the Statute Book, until in 1901 the law was consolidated in the Factory and Workshop Act. This is still the main enactment, though other Acts have subsequently been passed dealing with particular questions concerning factories.

The term "factory" is a very wide one and includes both textile and non-textile mills. Speaking generally a textile factory means any premises in which mechanically driven machinery is used for the manufacture of textiles. A non-textile factory is any premises in which manual labour is employed for the making, repairing, &c., of any article for sale and in which mechanical power is used to aid the manufacturing process.

Apart from certain specified exceptions mechanical power is necessary as a rule to constitute a factory within the meaning of the Act. Those premises in which mechanical power is not used, but in which manual labour is carried on by way of trade or for purposes of gain, are workshops.

An electric power station or sub-station comes within the category of a non-textile factory and is defined in the Act as being any premises, or that part of any premises, in which electrical energy is generated or transformed for the purpose of supply by way of trade or for the lighting of any street, public place or public building, or of any hotel, or of any railway, mine or other industrial undertaking.

Textile and Non-textile Factories

The chief practical distinction made in the Act between textile and non-textile factories relates to the hours of labour of young persons and women. With regard to all the other provisions, except where otherwise stated, those relating to factories apply equally to workshops. Workshops are under the control of the local authority and not under that of the Factory Inspector. The objects of the Acts are to ensure the health and safety of employés.

[Elliott and Fry.

Mr. J. W. Thomas

As regards the safety of workpeople, the Act stipulates that engines or parts of engines worked by power must be securely fenced and all dangerous parts of the machinery and every part of the mill gearing (transmission equipment) must either be securely fenced or be in such a position or of such construction as to be equally safe to every person employed or working in the factory as it would be if it were securely fenced. The fencing must be constantly maintained in an efficient state whilst the parts to be fenced are in motion or in use except when they are under repair or under examination.

The obligation to fence machinery is absolute. That was laid down in an important case, Watkins v. the Naval Colliery, 1921 (A.C.693). The fact that the machinery is so situated that there is little or no danger of accidents happening is no justification for not carrying out the requirements of the statute in regard to fencing. The obligation to fence is also unaffected by the fact that it may be commercially impracticable or mechanically impossible to fence the particular machinery securely.

The Court Decides

It is for the Court to say whether machinery is dangerous or not. The deciding principle was enunciated in the case of Hindle v. Birtwistle, 1897 (1 Q.B.192), in which it was held that "machinery is dangerous if in the ordinary course of human affairs danger may reasonably be anticipated from the use of it without protection. The contingency of carelessness of workmen in charge of the machinery and the frequency with the which the contingency is likely to arise are matters to be taken into consideration."

Contributory negligence on the part of the workman will not excuse; nothing but wilful misconduct will constitute a valid defence. Nor will an employer be able to excuse himself on the ground that one of his employés has been negligent in not seeing to the fencing of a certain machine, or that an employé has failed to repair or maintain the fencing, though he may exempt himself from the penalty by securing the conviction of the offender and proving that he had himself used all due diligence in enforcing the Act and that he was not responsible for the offence.

A court of summary jurisdiction, on the complaint of an inspector, may prohibit the use of dangerous machinery or, if such machinery is capable of repair or alteration, prohibit its use until it is duly repaired or altered. It is incumbent, therefore, upon the occupier of a factory to ensure that every part of his machinery which is dangerous or which seems likely to cause danger is fenced or protected. If he fails in this, even though no injury is caused to his employés, he is guilty of an offence and liable to a penalty. If injury is caused to a workman, and it is established that the machinery is dangerous and unfenced, the occupier is liable to a heavier penalty. An employer who has failed to fence machinery will, if injury is caused to a workman, be liable to pay both a penalty and damages.

A "Dangerous Industry"

A number of statutory Rules and Orders have been framed under the Factory and Workshop Acts dealing with what are called dangerous industries. The generation, transformation and distribution and use of electrical energy have been so certified, and regulations known as the Electricity Regulations have been made in order to prevent danger. They provide, in effect, that all apparatus and conductors shall be so constructed, installed, protected, worked and maintained, as to prevent danger as far as possible, also that all conductors shall either be covered with insulating material and further protected where necessary to prevent danger, or they shall be so placed and safeguarded as to prevent danger so far as is reasonably practicable.

It will be obvious that such conditions are very comprehensive and allow few, if any, loopholes of escape from liability if injury is caused as a result of contact with live conductors owing to those conductors being insufficiently protected or safeguarded. It is imperative that technical engineers who are responsible for electrical apparatus and machinery should ensure that no live portions are exposed or left unprotected. It does not follow, of course, that all conductors must be covered with insulated material, but if they are not, they must be protected, *e.g.*, by screens, so that persons cannot come into contact with them.

Several cases have occurred within recent years where workmen have been injured owing to insufficient protection or because the protection has been removed and workmen allowed to work in proximity to apparatus which was alive. It is obvious that there are occasions when workmen are required to work on electrical apparatus and to do this the ordinary protection has to be removed. When this occurs it is essential that live portions should be made dead. It will not be an excuse that the workman was careless and ought not in the ordinary course of events to have come into contact with live conductors.

Continuity of Supply Disregarded

Some technical engineers, minimising the danger to which their workmen are exposed, occasionally take risks in order to avoid an interruption of supply. While one can sympathise with the desire to maintain the continuity of the supply it has to be remembered that continuity should not be purchased at the risk of injury. It is better to err on the cautious side.

If injury is caused to an employé a court will not excuse the undertaker on the ground that it was necessary to take the risk in order to avoid an interruption. The duty of an undertaking to protect its workmen is absolute and it is no defence that the official in charge did what he thought was best in the circumstances.

One of the Regulations provides that where necessary to prevent danger adequate precautions shall be taken either by earthing or by other suitable means to prevent any metal other than the conductor from becoming electrically charged. Most undertakers have now developed an elaborate system in order to prevent the charging of apparatus upon which men are working. Automatic interlock systems are gradually being introduced and no doubt in time they will be so perfect that accidents arising from apparatus upon which men are working become charged will be almost impossible. Until that time arrives engineers cannot exercise too much caution in protecting workmen from accidents of this kind. The number of accidents reported to the Electrical Inspectors for the year 1931 shows that there is still a necessity for this warning.

Lesco House

NEW offices, workshops and stores have been built for the Engineering Department of the London Electric Supply Corporation, Ltd., at Lesco House, Stamford Street, S.E.1, from which the distribution work of the Corporation will be directed. The buildings are divided into three sections, viz., (1) The front section, to be used for the offices, with a static sub-station in a portion of the basement. The ground floor along Stamford Street is available for letting purposes. (2) The rear section, to be used as workshops and stores. (3) A garage at the western end of the yard between the two buildings.

The heating throughout these premises is electrical, by means of the low-pressure hot water, invisible panel system, combined with thermal storage. The heating as at present installed deals with a total capacity of about 225,000 cu. ft., but the electrical boiler plant is of sufficient size to deal with a future extension totalling about a further 100,000 cu. ft.

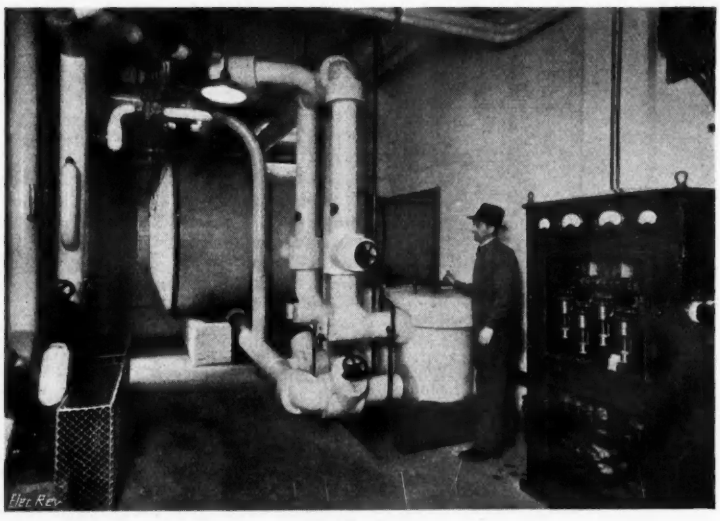
The Boiler Plant

The electrode boilers and the storage tank are fitted together in one chamber, the equipment comprising two "Bastian No. 80 electrode hot water circulators, each of 190 kW, 415 V. 3-phase, and a storage tank of 5,000 gallons with a maximum temperature of 240 deg. F.

On the left of the illustration of the plant can be seen the circulating pumps for accelerating the flow of hot water round the building. There are two of these, one being a stand-by, and they are controlled by hand switches on the right-hand side of the main switch panel. Overhead, in the centre, is the mixing valve which regulates the flow temperature of water in the heating system. This valve is controlled by a thermostat in the water circuit and a second air thermostat in one of the south rooms on the ground floor. At one end is the main storage cylinder, on the left of which may be seen the

Front view of Lesco House

thermostats controlling the two electrode boilers through contactors on the main switch panel on the right. The electrode boilers are also controlled by a time switch situated in the lower half of the panel which switches them on and off at pre-arranged times with a fifteen-minute interval between them.



The boiler room

The electrode boilers are very small, being only 5 ft. high and 30 in. in diameter. Isolating valves are fitted in the flow and return pipes connecting the boilers to the storage tank, and safety thermostats are fitted in the pipes to protect the boilers should the valves be inadvertently closed. The domestic hot water supply is by a "Bastian" 100-gallon 24-kW direct-type heater situated in the main building, and a second 30-gallon heater rated at 9 kW is situated in the stores at the back of the building. Both these heaters are thermostatically controlled.

The heating, thermal storage, and domestic hot water supply systems have been designed and installed by Messrs. Rosser & Russell, Ltd., the electrode boilers and heaters being supplied by Messrs. Bastian & Allen, Ltd. The general wiring of the premises has been carried out by Mr. W. M. Williamson, of Peckham Rye, S.E. The architects for the building were Messrs. George Lansdown & Brown, F.R.I.B.A.

Dutch Electrical Imports and Exports

FROM the Dutch official trade returns for the half-year ending with June last we have compiled the appended tables showing the imports into and exports from Holland of electrical machinery and allied goods during the first six months of 1931 and 1932, from which it will be seen that both branches of the trade have been seriously affected by the general industrial depression and show a decline of over 40 per cent. For the purposes of comparison the Dutch guilders have been converted at the normal rate of 12 to the £:—

Imports. January–June,

		1931. Quantity.	1931. Value £.	1932. Quantity.	1932. Value £.
Electrical machinery and parts	tons	2,317	310,916	718	92,915
Telegraph and telephone apparatus, material and parts	,,	1,359	270,833	1,291	212,500
Radio teleg. and teleph. apparatus and parts ...	,,	1,632	589,833	1,014	294,835
Incandescent lamps	No.	1,903,800	62,583	2,373,500	29,415
Arc lamps	tons	11	2,418	11	2,165
Copper and brass wire and cables, not insulated ...	,,	3,389	175,833	1,940	68,500
Vacuum cleaners	No.	28,351	139,083	29,197	101,165
Wire and cables, insulated ...	tons	8,791	318,085	5,485	168,580
Electric lamp bulbs	,,	—	—	74	3,830
Other electrical apparatus ...	,,	3,466	417,916	3,279	288,830
Total imports			£2,287,500		£1,362,735

The figures relating to machinery show that Germany continues as the leading supplier, Belgium being second, the United States third and Great Britain fourth, having, however, experienced a slight increase. Germany still retains the major portion of the trade in telegraph and telephone instruments. The same is true as regards radio material, it being noticeable, however, that Great Britain has risen from third to second place.

Japan now heads the list for electric lamps, followed by Germany. The latter country is credited with 21,580 of the imported vacuum cleaners, followed by the United States with 2,418, Sweden 2,250, Italy 1,628, France 605, Denmark 308, and Great Britain 265. As regards insulated wires and cables, 4,834 tons, or nearly 90 per cent., came from Germany, with only small quantities from Belgium, Italy, Czecho-Slovakia, Great Britain, and the United States, in that order:—

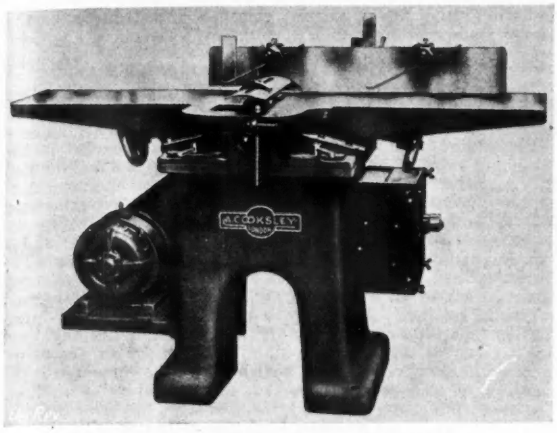
Exports. January–June,

		1931. Quantity.	1931. Value £.	1932. Quantity.	1932. Value £.
Electrical machinery ...	tons	852	83,750	440	44,750
Telegraph and telephone apparatus, material and parts	,,	142	13,500	110	12,000
Radio teleg. and teleph. apparatus and parts ...	,,	4,431	2,064,583	2,306	1,326,585
Incandescent lamps	No.	16,440,100	636,500	8,457,900	287,915
Arc lamps	tons	89	13,750	29	3,080
Electric lamp bulbs		—	—	601	36,250
Copper and brass wire, not insulated	,,	279	15,332	287	9,915
Vacuum cleaners	No.	963	4,000	2,066	8,915
Wires and cables, insulated...	tons	3,128	141,750	2,018	74,750
Other electrical apparatus ...	,,	1,190	165,250	385	9,330
Total exports			£3,138,415		£1,813,490

With regard to the exports, Belgium is the best customer for Dutch electrical machinery, followed by Germany, Great Britain, the Dutch East Indies, France, India, and Argentina. Great Britain took the bulk of the Dutch shipments of telegraph and telephone material, vacuum cleaners and lamp bulbs.

Electricity in the Building Industry

AT the Building Trades Exhibition, which opened at Olympia last week, there are many new woodworking machines to be seen. Messrs. J. Sagar and Co., Ltd., show a rising-table circular saw bench with a built-in motor and V-belt drive, also a planing and moulding cutter grinding machine with a circular saw sharpening attachment, a built-in



The Cooksley planing and moulding machine

motor and push-button control. Guillet, Sons and Co., Ltd., exhibit a new panel-planing and thicknessing machine with two-speed gear, a straight line edger and ripping saw, with two motors, four feed speeds, and push-button control. Their extra heavy vertical-spindle moulding machine has a built-in, double-rotor motor and works at three speeds, and their high-speed five-cutter planing and moulding machine has a direct motor drive and vertical and horizontal adjustments to the four last blocks, a motor being provided for each block.

The exhibit of the Dominion Machinery Co. includes a small sand-papering machine and a "Model" Elliot woodworker capable of a variety of operations. The 3-h.p. motor (for a.c. or d.c.) is mounted on the machine and the cutting spindles are driven direct. A. Cooksley shows a surface planing and moulding machine with the motor built into the base; a specially designed belt tension arrangement takes the weight of the motor off the belt. Danckaerts Woodworking Machinery, Ltd., and Thomas Robinson & Son both exhibit several new machines with self-contained electric drive. Wilson Bros. (Leeds), Ltd., have two heavy-duty planing and thicknessing machines and a "Universal Woodworker." Interwood, Ltd., shows a range of 2-h.p. electric routers.

Sprayers and Compressors

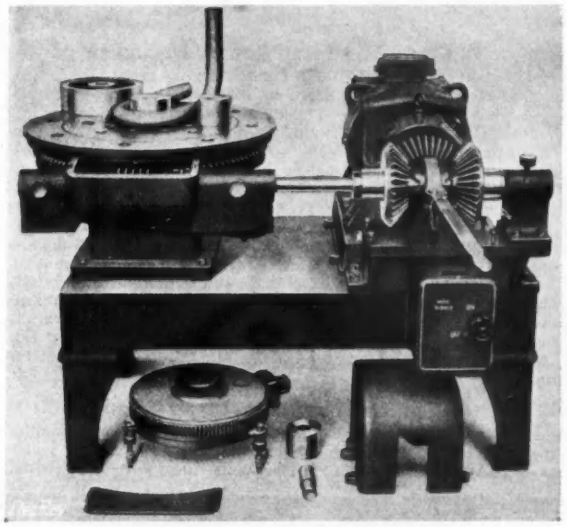
A new ½-h.p. portable paint-spraying equipment is put forward by Aerostyle, Ltd. B.E.N. Patents, Ltd., also introduce a ¼-h.p. model for small work. Messrs. Kurt Erlach, Ltd., have improved their paint-spraying equipment; their Volspray I plant has a ½-h.p. fan-ventilated universal motor; Volspray II has tappings for 200-220 V and 230-250 V.

Lacy, Hulbert and Co. exhibit a new design of air-cooled air compressor for inflating tyres and working small pneumatic tools. Models of new electric cranes are shown by Butters Bros. The Kango Co. Ltd.'s improved type "B" hammer has a new transmitter and a more robust, totally enclosed motor. A new 100-W small hammer is light, runs on ball-bearings, jumps holes up to ⅜ in., and is operated by a springless thumb switch. The new Kennedy bar-bender, with Crypto-Langham geared motor, is capable of bending bars up to 2 in. in diameter. Electric blind rollers, shown by Electric Rollers, Ltd., now have the motor placed inside the roller.

New lighting fittings are shown by Messrs. Hyder and Sons, their period chandeliers being particularly attractive. The London Sand Blast Decorative Glass Works, Ltd., has a "Bromesh" glass with low absorption, made in delicate colours, and suitable for diffused lighting. Their "Fireglas" is made in a number of different densities. The Interoven Stove Co. lights its stand with "Boula" reflector lamps which have the upper part of the bulb silvered to form a reflector.

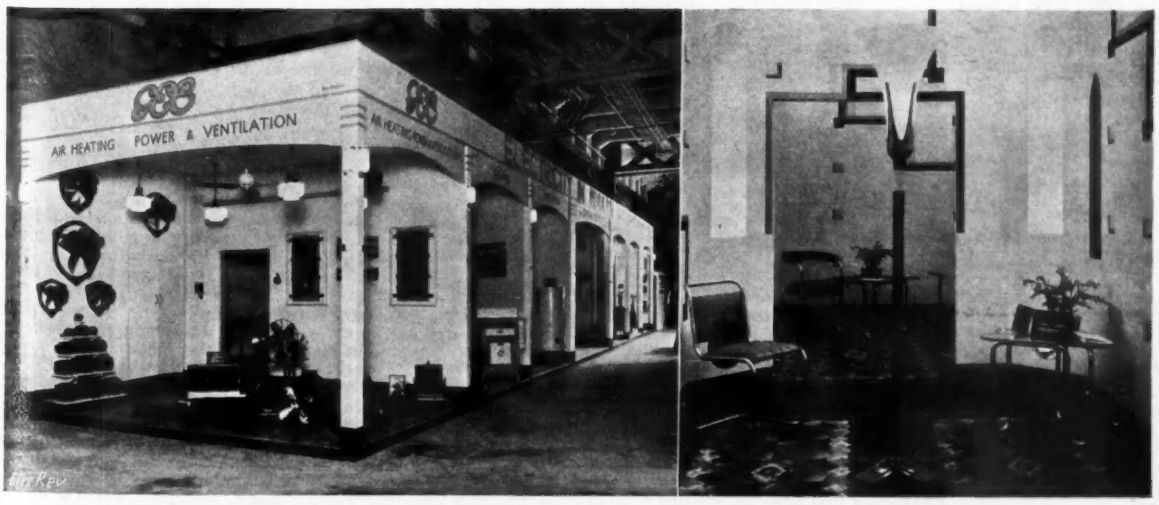
Lighting Fittings and Domestic Appliances

The General Electric Co., Ltd., shows new tubular lamps and pendant fittings, in addition to a large range of domestic and commercial cookers and other apparatus. The two reception rooms have a special display of modern, decorative panel lighting. The same company shows a fire combined with a hot-plate, a prepayment fire for hotel use, and a new system of panel heating which can be recessed into the wall. A new cooker which is exhibited has a permanent ventilator at the back of the oven, an inclined thermometer for convenient reading, and three heats on both the oven and the hot-plate. This company's water heaters have been improved.



The Kennedy electrically driven bar bender

Frigidaire, Ltd., shows a 1½-2-h.p. large water-cooled compressor. A special point is being made of the economy effected if the refrigerating company has access to a block of flats during the building. Bakelite, Ltd., exhibits Ferranti clocks in "Bakelite" cases and "Electronos" ends for tubular lamps.
—VIOLA RIPLEY, B.Sc.



A group of stands and a rest room arranged by the General Electric Co., Ltd.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Australian Tariff Inquiry

The Australian Tariff Board has concluded an inquiry into the necessity for the increased duties on electrical apparatus included in the tariff resolution of May 3rd, which has to be approved by Parliament. Mr. E. Bate, of the Victorian Electricity Commission, asked that the duty on turbo-alternators should be reduced. He said that important improvements might be introduced by any one of almost a dozen overseas manufacturers, and the effect of even a comparatively small improvement in steam consumption would be to influence greatly the buyer's choice of a machine on economic grounds. After reviewing figures submitted in tenders, the Commission considered that the effective protection had been about 250 per cent., due to the fact that only about one-sixth of the machine was made locally.

When the Board was inquiring into the duties on switches and fuses Mr. H. W. Hammond, Melbourne manager of Messrs. W. T. Henley's Telegraph Works Co., Ltd., contended that the rates proposed by local manufacturers were far beyond their need to protect the industry. The present fixed duty of 8s. on a 15-A fuse was equivalent to about 660 per cent. *ad valorem*, or ten times the alternative *ad valorem* rate shown in the schedule. The suggested fixed rate of 4s. would be equivalent to 330 per cent. Mr. C. W. Goodman, representing the English Electric Co., Ltd., contended that the existing rate of 65 per cent. (British preference) was much higher than was necessary, and that the previous rate of 35 per cent. would adequately protect local manufacturers

The Rochdale Ideal Homes Exhibition

In the sixth annual Ideal Homes Exhibition, which was opened at Rochdale on September 14th by the Princess Royal, one of the leading features is an all-electric bungalow, which has been completely equipped with the latest lighting and labour-saving appliances by the Corporation Electricity Department. The Department, acting jointly with the General Electric Co., Ltd., the Credenda Conduits Co., Ltd., the Hotpoint Electrical Appliance Co., Ltd., Beardsalls, Ltd., and Burnley Components, occupies a central group of stands where there are a comprehensive display of electrical apparatus and demonstrations of electric cooking, washing and cleaning. Messrs. G. L. Adamson, Ltd., are exhibiting and demonstrating Beatty washing machines, ironers and "Dryquick" cabinets, making a complete laundry outfit. Other exhibitors of electrical appliances are Messrs. Hoover, Ltd., the Rochdale Electric Co., Ltd., Messrs. Bannister and Fitton, and Messrs. J. K. Cotton and Co.

A Synchronous Clock Display Van

The way in which an ordinary van body has been adapted to give a bold display for synchronous clocks is shown in the accompanying illustration. The vans themselves, of which

One of the attractive vans of Smith's English Clocks, Ltd.

Smith's English Clocks, Ltd., now have several on the road, have attracted considerable attention and seem to be doing good work in popularising the new time-keeping system.

Copper Producers' Conference

According to *The Times* a meeting of the copper producers of the world outside of the United States will be held in October in one of the capitals of Europe, probably London, for the purpose of discussing production and the sales quota of each company in the markets outside those protected by tariff walls. The tariff of 4c. per lb. levied on copper imported into the United States since June 21st, and the proposed duty of 2d. per lb. on copper brought into Great Britain by all non-Empire producers, are factors which have made such a conference necessary, since these tariff walls have seriously disturbed, and will further affect, existing channels of distribution in the copper trade.

The Hotel Lighting Campaign

The second stage of the Hotel Lighting Campaign organised by the British Electrical Development Association and the Electric Lamp Manufacturers' Association was reached on September 16th, when a letter and enclosures were sent to the firms and undertakings on the Association's special mailing list. The matter enclosed with the letter dealt with the subject of reports upon the existing installations in hotels. It comprised a guide to the preparation of these reports, together with some notes on "follow-up" tactics; a set of report forms; and a specimen copy of form of report for hotel managements. The report forms are in triplicate, it being intended that one copy shall be sent to the area officer, one to the circle secretary, and the third retained. Provision is made in the report for information regarding the exterior lighting of hotels (floodlighting, signs, canopies, &c.), and the illumination of the various public rooms and apartments. The next move in the campaign is the despatching of letters and booklets for circulation to the hotel managements.

A New Departure

Something out of the ordinary in advertising which will earn the approval of interested readers appears in this issue. We refer to the coloured supplement of the General Electric Co., Ltd., giving dealers full details, with illustrations, of the complete range of "Magnet" fires which are now available. In this convenient form it is possible to see almost at a glance the nature and prices of all the models and the necessity for writing for further particulars is avoided.

A Radio Exhibition Convoy

Next Monday there will leave the headquarters of the Radio Manufacturers' Association in Aldwych a radio convoy consisting of over a hundred illuminated and decorated showroom-lorries *en route* for the Northern Radio Exhibition at Manchester. The route will be by way of Leicester, Derby and Stockport, and frequent stops will be made at large towns for the purpose of giving radio concerts to the public.

The Exhibition of Inventions

The Lord Mayor of London (Sir Maurice Jenks) will open the eighth International Exhibition of Inventions at the Central Hall, Westminster, on October 5th, and the exhibition will remain open until October 15th. The exhibits of electrical interest will include a low-tension accumulator, with a loose top which does not need sealing with pitch and greatly facilitates the washing of the cell and the renewing of the plates; new type of inductance coils for tuning over wide ranges of wavelengths; and two kinds of cable clamps, one a tapping clamp that enables "live" high voltage wires to be tapped and connected with secondary lines without diversion of the current, and the other a small splice for all kinds of line connections.

Harrogate Corporation Fined

The Harrogate Corporation was summoned at Knaresborough last week under Section 136 of the Factories Act, and was fined £10, with £3 13s. costs and ten guineas advocate's fees. The prosecution arose out of an accident at the Knaresborough Bond End sub-station. A workman engaged on the switchboard was fitting an additional panel, and was taking off a plate when he received a shock. The voltage was 11,000. The Corporation pleaded guilty, and stated in mitigation that the plate had merely been taken off for inspection, and that the accident had occurred either through a misunderstanding or because the instructions had not been properly carried out. The Corporation had since taken additional precautions to prevent the recurrence of such an accident.

British-built Balancing Machines

Messrs. Edward G. Herbert, Ltd., have entered into an agreement with the Tinius Olsen Testing Machine Co. of Philadelphia, Pa., U.S.A., to manufacture under licence at their Levenshulme works, Olsen-Lundgren static-dynamic machines for balancing crankshafts, flywheels, armatures, rotors, &c. The company has acted as sole agents in Great Britain and Ireland for Messrs. Olsen for the last twenty-five years. The latest Olsen-Lundgren cradle type electric spark horizontal static-dynamic style "S" balancing machines designed for fast production work will be built.

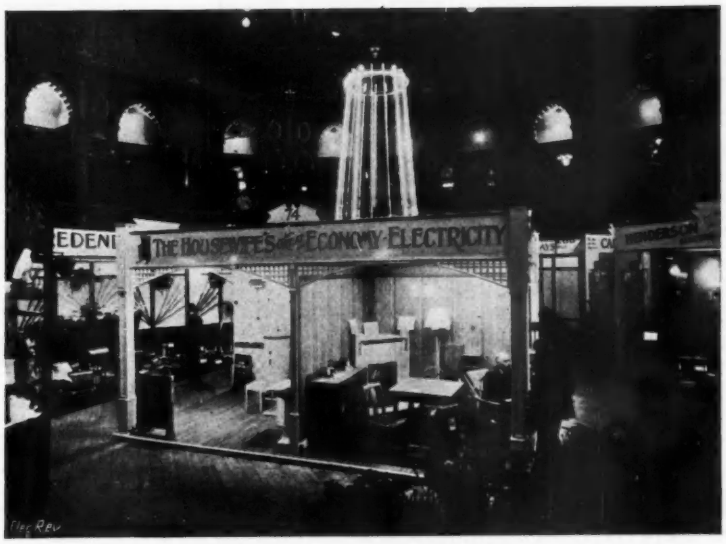
Not at their Expense!

Following the request made to the Bradford City Council by the local Citizens' League for an independent investigation into the affairs of the Corporation's Electricity Department because of alleged unsatisfactory trading results, complaints of excessive charges for electricity, and in view of the capital expenditure on experimental work, the Electricity Committee expressed the view that as a Special Administration Sub-Com-

mittee had already reported on every section of the Department, an inquiry at the ratepayers' expense would be a waste of public money. The Committee, however, offered to give every facility for an inquiry paid for by the Citizens' League, so long as it was conducted by an electrical engineer of standing to be nominated by the president of the Institution of Electrical Engineers. The Citizens' League Executive Committee has declined this offer " as there is no likelihood of the League having sufficient funds for such a purpose."

The Brighton Exhibition

The Brighton Lighting, Heating, Electrical and Cooking Exhibition was opened on September 14th at the Dome and Corn Exchange by the Mayor, Ald. T. J. Braybon. Although gas, paraffin and coal are represented, this section is small, and the keynote of the whole exhibition is the use of electricity for domestic purposes, such as heating, cooking, and cleaning. To those whose business is that of catering, whether hotel or restaurant, by far the most important exhibit is the all-electric kitchen, which can cook all the food required in large hotels. Mr. H. May's " Robot " has been a very popular feature. The exhibitors include Messrs. Page & Miles, Ltd., M. Peyton & Co., Bostel Bros., H. J. Galliers, the British Thomson-Houston Co., Ltd., the Henderson Electrical & Wireless Service, the Brighton Corporation Electricity Department, the Phœnix Ironmongery Co., the British Electric Domestic Appliances, Ltd., the General Electric Co., Ltd., and the Brighton Lighting and Electrical Engineering Co., Ltd. A general view of the exhibition is reproduced herewith.



A view of the Brighton Exhibition

Employment During August

According to the *Ministry of Labour Gazette*, employment in the engineering industry during August showed little change and remained bad, the total out of work being 274,537 as against 275,087 in July; the percentage unemployed was 27.3, as compared with 27.4. In the electrical engineering section the number of unemployed decreased from 15,163 to 15,057 (from 16.4 to 16.3 per cent.). There were declines from 14,558 to 13,268 (from 13.4 to 12.2 per cent.) in the electric cable, wire and lamp manufacturing group, and from 5,179 to 4,806 (from 23.1 to 21.4 per cent.) in the electrical wiring and contracting industry.

German H.P. Cable Patents

It is announced that the Felten and Guilleaume Co. has granted licences, among others, to two English cable companies and one French firm for the construction of high-pressure cables according to the patents of the German company.

Indian Electrical Imports

A survey issued by the Department of Overseas Trade relating to the import trade of India during the three months ended June 30th last records a decline from Rs. 65 lakhs to Rs. 44½ lakhs in electrical machinery imports, as compared with the corresponding period of 1931, the United Kingdom's share falling from Rs. 42 lakhs to Rs. 33 lakhs. There was also a further decrease in the total import trade in electrical goods and apparatus from Rs. 68¼ lakhs to Rs. 60½ lakhs; the United Kingdom was responsible for Rs. 32¼ lakhs worth (against Rs. 35 lakhs), while imports from Germany and the United States fell from Rs. 10½ lakhs to Rs. 8½ lakhs and from Rs. 7¼ lakhs to Rs. 7 lakhs, respectively. Imports of electric fans, which in April-June, 1931, had been reduced to Rs. 5¼ lakhs, showed an increase to Rs. 8½ lakhs; those bought from the United Kingdom increased from Rs. 3¾ lakhs to Rs. 5 lakhs. Purchases of electric wires and cables (rubber insulated) at Rs. 5¾ lakhs were Rs. 2 lakhs lower, but there was little change with regard to the trade in electric wires and cables with insulations other than rubber. Imports of gasfilled lamps declined from Rs. 4½ lakhs to Rs. 3½ lakhs, the United Kingdom's share being reduced from Rs. 2 lakhs to Rs. 1¾ lakhs. The battery trade improved slightly from Rs. 2½ lakhs to Rs. 2¾ lakhs, but there was a decrease from Rs. 4½ lakhs to Rs. 2½ lakhs in accumulator imports.

The Imperial Bank of India building at Guntur

The Lead Market

The closing prices for lead on September 16th were 5s. per ton lower on the week. The market has been very irregular, prices fluctuating from session to session according to the latest reports received from Wall Street. There seems little justification in the statistical position for a renewal of the upward movement, but sentiment backed by speculative purchases can hoist prices temporarily, and it may be that a fresh effort will be made to put commodity values on a higher level once again. According to the Board of Trade returns for August, imports amounted to 21,997 tons and exports to 825 tons, leaving 21,172 tons for home consumption.

Prices of Materials

Messrs. F. Smith & Co. report, September 21st: Electrolytic copper, no change. Silicium bronze wire, 7¾d., 3/16d. dec.

Messrs. Edward Till & Co. report, September 21st: India-rubber, Para fine, 5½d., ½d. dec.

Messrs. James & Shakespeare report, September 21st: Copper bars (best selected), sheet and rod, no change. English pig lead, £14 10s., 5s. inc.

An Electrical Exhibition at Croydon

An electric home exhibition, organised by the Croydon Corporation Electricity Committee, will be formally inaugurated on Wednesday next by the Mayor at the Croydon Public Hall.

An Indian Bank Installation

An interesting wiring contract has recently been completed by the Crompton Engineering Co. (Madras), Ltd., at the Imperial Bank of India, Guntur. The building illustrated is of a type much favoured in Southern India; the construction is concrete, and the walls are of moderate thickness to exclude heat. The installation was carried out entirely with the " Nomet " wiring system, the wires for the greater portion being run on teakwood strips.

Canadian Radio Sales

According to *World Radio*, the number of receiving sets sold in Canada in 1931 was 286,122, which compares with a total of 223,228 in the previous year. There was, however, a decline in value: in 1931 the value of sets sold was £3,628,269 at factory prices, while in 1930 the value on the same basis was £4,555,245. The production of receiving sets in Canada in 1931 was 291,711, compared with 170,082 in 1930. The advance in the number of receivers sold in 1931, compared with 1930, was wholly due to the rise in the sales of a.c. receiving sets, the increase in these sales as between the two years being from 186,494 to 263,364. This gain was more than sufficient to offset the drop in both electric combination and gramophone sets and in battery sets. The former of these declined from 26,470 to 13,738, and the latter from 9,682 to 6,335. The last three months of the year accounted for more than 46 per cent. of the total sales during 1931. The increase in sales during 1931 was common to all the provinces. The greatest gain was made in Ontario, where the number sold advanced from 104,155 in 1930 to 126,404 in 1931. Quebec came second with 78,171 against 61,512 in the previous year.

Irish Free State Electrical Imports

A fair degree of activity continues to prevail in the electrical trade in the Irish Free State, the imports of electrical machinery, fittings, and apparatus during July last amounting to £58,047, bringing up the total for the seven months ended with July last to £397,037 as compared with £573,250 in the corresponding period of last year. The details of the seven months' imports are appended :—

	First seven months, 1931. £.	1932. £.
Electrical machinery	112,877	118,395
Electric wires and cables	54,744	62,510
Wireless sets and parts	51,863	99,637
Electric lamps and parts	35,720	29,946
Other electrical goods	104,301	80,331
Copper wire	13,745	6,218
Totals	£373,250	£397,037

Polish Electrical Imports

The value of conductors, apparatus and other electrical materials imported into Poland in June last amounted to 2,244,000 zlote.

Patent Restoration

An order was made on September 15th, 1932, restoring letters patent No. 284,716, granted to W. Leyhausen, for an invention of an " Automatic multipolar toggle lever electric switch."

Gasfilled Lamp Litigation in France

According to our French contemporary *L'Electricien*, the Chambre Civile de la Cour de Cassation has lately given a decision that no patents were infringed by French makers of gasfilled electric lamps. The case was an appeal by the Compagnie des Lampes against the decision in June, 1927, of the Cour d'Appel de Paris confirming the verdict in June, 1923, of the Tribunal de la Seine in favour of M. Leopold Levy, M. Alfred Monnier, and others. The defendants in the original patent infringement action submitted three anticipations of the patent applied for in France on December 20th, 1913, and granted on March 6th, 1914, the concession for which was held by the French Thomson-Houston Co. The Chambre Civile in its recent decision based it mainly on the Syndic-Larsen patent of 1899, that of Henry of 1900 and that of Letang of 1907, and held that the elements, the combination of which was the subject of the 1914 patent, were already known .

" Bits and Pieces " for the Radio Trade

During the past week we have had an opportunity of inspecting the new works of Messrs. Belling & Lee, Ltd., on the Cambridge Arterial Road, Enfield.

Started about ten years ago by Mr. C. R. Belling (the well-known cooker manufacturer) and Mr. E. M. Lee, in a small works at Ponder's End, the company has specialised mainly in the manufacture of terminals, wander plugs, fuses and other small radio connections. For a long time the main demand came from builders of home-constructed receiving sets, but now some 150 manufacturers of complete receiving sets use the company's products.

The new factory is a typical example of modern single-storey, fireproof, north-light construction of steel, glass and asbestos, its long horizontal lines giving the exterior an attractive appearance. It occupies about 22,000 sq. ft., or approximately one-third, of a freehold site of 2½ acres, the remaining two-thirds being at present used as a sports ground for the employés. Already about 250 people—mostly young women—are employed, but the number is to be increased to 300 in the near future.

The works are very well situated for the transport of raw material and finished goods. A noteworthy feature of the finished goods stores is that the component parts are stored in buckets hung on hooks on racks instead of in the usual tiers of wood or steel bins. About a quarter of a million small parts are made each day and the stock kept on hand roughly amounts to between sixteen and seventeen millions. We were informed by Mr. Lee, under whose direction the works are run, that they have very largely ousted the foreign competitors who formerly controlled the British market.

Ample provision has been made for the welfare of the employés, including " quick-spray " wash fountains round which a large number can wash simultaneously in running water.

Electrolux Works Extension

Electrolux, Ltd., has decided to extend its Luton works, to build new offices and to increase the productive capacity by utilising for manufacturing purposes the space occupied by the present offices. The scheme also provides for the erection of a receiving depôt and raw material store, as well as an extension to the finished stores, which will accommodate some thousands of the company's products. The new building is expected to be completed in about five months' time.

Trade Announcements

On Monday last the Z Electric Lamp & Supplies Co., Ltd., opened a new branch at 62, Dingwall Road, Croydon. Some 5,000 sq. ft. of floor space are provided on two floors, the lower being devoted to the every-day requirements of the contractor. Above is shown a wide range of electrical fittings and domestic appliances, special rooms being set apart for radio demonstrations.

On and after October 1st the address of the London office of Messrs. Richard Johnson & Nephew, Ltd., will be :—Melbourne House, Aldwych, W.C.2 (Telephone : Temple Bar 9055/6/7).

A Coming-of-Age

To-day marks the coming-of-age of the " Henley " wiring system, for the Electrical Exhibition held at Olympia in 1911, at which the system was introduced, opened on September 23rd. The company's idea in bringing out this system was to make the installation of electric wires as easy as the running of gas pipes with favourable results upon the cost. In reality there were two systems—concentric and twin—each with its special attributes but both with a sheathing of special alloy with which continuity and efficient earthing were obtained. The company claims that since its introduction twenty-one years ago the system has been installed in more buildings than any similar system. It has been applied to castles and cottages and all kinds of buildings in all parts of the world and some of the earliest installations are still giving satisfactory service. The success of the system has led to the development of the " Bondit " and " Nomet " (all-insulated) systems which are now also going strong.

New Catalogues and Lists

Union Glue & Gelatine Co., Ltd., Cransley Works, Garrett Street, Golden Lane, E.C.1.—A pamphlet describing the new " Olbo " pipe wrench, which combines the principles of the American adjustable wrench and the angular crocodile wrench.

Stanley Electrical Co., Latimer Works, Teddington, Middlesex.—Leaflet T.S.5, giving particulars of a new 30-hour time switch.

Edison Swan Electric Co., Ltd., 123-5, Queen Victoria Street, E.C.4.—A 182-page catalogue, bound in a serviceable imitation leather cover, relating to the company's complete range of cables. There are several illustrations and any particular item can be speedily found by means of a well-designed thumb index.

London Electric Firm, Brighton Road, Croydon.—A leaflet giving particulars of a wide range of searchlights of all types which are now available.

The works of Messrs. Belling & Lee, Ltd., on the Cambridge Arterial Road

Mullard Wireless Service Co., Ltd., Charing Cross Road, W.C.2.—A folder dealing with the improved non-microphonic " P.M.1.H.L." 2-volt detector valve.

Wild-Barfield Electric Furnaces, Ltd., Elecfurn Works, North Road, Holloway, N.7.—An illustrated catalogue describing small electric furnaces for works and laboratory use.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—An illustrated broadsheet dealing with the " Gecoray " shop-window lighting system.

British Insulated Cables, Ltd., Prescot, Lancs.—Publications

Nos. P.F. 96 and C.1.H., relating respectively to the B.I. iron-clad d.p. switch and fuse box, and braided aerial and "Rockbestos" cables and wires.

Drayton Regulator & Instrument Co., Ltd., West Drayton, Middlesex.—List No. 183, dealing with a series of thermostatic switches.

British Electric Domestic Appliances, Ltd., 3, Hanover Court, Moor Lane, E.C.2.—A showcard and leaflets in connection with the "Mary Ann" vacuum cleaner and the "Bedal" electric iron.

Electric Art Shades (1928), Ltd., Kelvedon, Essex.—Two leaflets showing various new types of lamp shade in imitation vellum, "marbleoid" and "electoid."

Premier Electric Heaters, Ltd., Keeley Street and St. Andrew's Road, Birmingham.—A list describing the new "Laundwell" iron.

The Henley wiring system knows no "class distinction." It is installed in both Glamis Castle (left) and in cottages at Wortley Village

Shaw, Son & Greenhalgh, Ltd., Albert Works, Huddersfield.—A leaflet illustrating high-pressure valves and boiler mountings.

Watliff Co., Ltd., 175, Merton Road, Wimbledon, S.W.19.—Particulars of a new face commutator just being placed on the market.

Renold & Coventry Chain Co., Ltd., Renold Works, Didsbury, Manchester.—An illustrated brochure on printing transmission systems.

Henderson Electrical & Wireless Service, 54, Queen's Road, Brighton.—Particulars of a new hire-purchase scheme for electrical and radio apparatus.

Falk Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1.—An effective showcard illustrating a few of the "Efesca" domestic electrical appliances. Also a 52-page illustrated catalogue (No. 670) of the new season's radio apparatus.

Murex Processes, Ltd., Ferry Lane Works, Forest Road, E.17.—A leaflet describing the company's all-welded factory.

Switchgear & Equipment, Ltd., Banbury.—An illustrated leaflet dealing with one of the company's lift-out fuse-isolators.

Philips Lamps, Ltd., 145, Charing Cross Road, W.C.2.—The September issue of the "Philips News" announcing a reduction in the price of "Philiray" reflectors.

Siemens Brothers & Co., Ltd., Woolwich, S.E.18.—Pamphlet No. 480A, entitled "Wireless Telephony at Sea," prepared primarily for the information of shipowners who have not yet had experience of wireless service.

Wardle Engineering Co., Ltd., Old Trafford, Manchester.—A leaflet, illustrating and describing "Wardelyte" glassware.

Electroway Heaters, Ltd., Baxter Gate, Loughborough.—Lists F.2 and G.2, giving particulars of "Electroway" fires and tubular heaters.

Lighting Trades, Ltd., 51-55, Garratt Lane, Wandsworth, S.W.18.—The company's new season's electrical accessories catalogue (No. 426), containing 64 pages copiously illustrated.

Dictograph Telephones, Ltd., Aurelia Road, Croydon, Surrey.—A brochure in connection with the company's dictograph telephone system.

J. H. Tucker & Co., Ltd., King's Road, Tyseley, Birmingham.—A trade price list of tumbler switches, ceiling roses, and lampholders.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—A service manual dealing with the "Model 248" two-valve battery operated receiver.

John Dugdill & Co., Ltd., Hazel Grove, Stockport.—Two leaflets describing movable, focusing, self-sustaining fittings for all purposes.

Bankruptcy Proceedings

R. Braham (trading as B. Braham), radio condenser maker, late of 1, Mallow Street, E.C.—The statutory first meeting of creditors was held on September 19th at Bankruptcy Buildings, Carey Street, W.C. The receiving order was made on September 5th on the petition of the Albion Manufacturing Co., which alleged as the act of bankruptcy the execution by the debtor on July 29th of a deed of assignment of his property in favour of a trustee on behalf of his creditors in general. The debtor attributes his insolvency to trade depression, the fall in prices, losses through pilfering, and also losses from recent contracts and on the forced sale of assets under distress for rent. A statement of affairs was submitted showing liabilities of £2,232 (ranking £2,226) and no net assets. It appeared that the Court had already made an order adjudging the debtor a bankrupt, and the meeting resulted in his estate remaining in the hands of the Official Receiver as trustee.

J. H. Maddox (lately trading as the Imperial Electrical Supplies, Co.), 14, Whitecross Place, Finsbury Pavement, E.C.—The statutory first meeting of creditors was held on Monday at London Bankruptcy Buildings. The debtor attributes his failure to trade depression and lack of capital. The liabilities are estimated at £460, and in the absence of any assets the case was left with the Official Receiver to be wound up in bankruptcy.

M. Tinner (trading as the Yorkshire Trading Co.), electrical factor, 91, Porter Street, Hull.—The first meeting of creditors was held at the Official Receiver's Office, 37, Scale Lane, Hull, on September 14th. The debtor had filed a statement of affairs which showed ranking liabilities of £260, with net assets of £65, leaving a deficiency of £195. The failure was attributed to "lack of capital, illness of self and family, and bad summer trade." The case was left in the hands of the Official Receiver, as trustee.

F. O. Tosswill, electrical engineer, 60, Wodeland Avenue, Guildford.—Receiving order made, September 8th, on a creditor's petition.

F. R. A. Lock and **V. C. Lock** (Lock Brothers), electrical engineers, Union Street, Stourbridge.—Receiving order made, September 9th, on debtors' own petition.

E. Gould (Gould & Co.), electrical and radio engineer, High Street, Lee-on-Solent.—Receiving order made September 13th on debtor's own petition.

R. E. Baxter, electrician and wireless dealer, 77, Hackthorn Road, Sheffield.—Receiving order made September 13th on debtor's own petition.

H. A. Mayhew, electrical contracting engineer, 96, London Road, Apsley.—Receiving order made September 12th on debtor's own petition.

T. H. C. Hughes, electrical and wireless engineer, 1090, Manchester Road, Bradford.—Last day for receiving proofs for dividend September 30th. Trustee, Mr. J. O. Morris, 71, Manningham Lane, Bradford, Official Receiver.

P. R. Andrews, electrical engineer, Middleton Street, Wymondham.—Last day for receiving proofs for dividend October 1st. Trustee, Mr. C. B. L. Prior, 4, Eastbourne Place, Prince of Wales Road, Norwich.

A. M. Hyde, electrical and radio engineer, 4, Duke Street, Congleton.—First and final dividend of 3s. 6¾d. in the £, payable September 29th at the Official Receiver's office, 12, Lonsdale Street, Stoke-on-Trent.

Company Liquidations

Metro Radio, Ltd., 53, Doughty Street, W.C.—The report of the Official Receiver in charge of this company's liquidation has been issued, together with a summary of the statement of affairs which shows liabilities of £5,403, against assets given as "fire claim £11,904," and an issued capital of 5,000 ordinary shares of £1 each. On October 1st last, a fire occurred at the company's factory in which the whole of the stock is stated to have been destroyed while the machinery, fixtures, &c., were rendered useless. The assets were insured against fire and a claim for £11,904 has been lodged in respect of loss sustained through the fire. The underwriters have, however, repudiated all liability under the policy and the failure of the company is attributed solely to the non-settlement of the claim. Mr. R. Large has been appointed liquidator.

Mayer & Co., Ltd.—Winding up voluntarily. Liquidators, Mr. L. S. Findlay, 35, Windsor Place, Cardiff, and Mr. O. J. Davies, 31, Queen Street, Cardiff. Particulars of claims by October 31st to the liquidators.

North East Electric Co., Ltd.—Winding up voluntarily. Liquidator, Mr. W. F. Edwards, 111, Grosvenor Road, S.W.

R. Elleray, Ltd.—Meetings, October 14th, at 51, Highgate, Kendal, to receive an account of the winding up by the liquidator, Mr. S. W. Clarke.

Auto Electric Devices, Ltd.—Meeting, October 14th, at 103, Church Road, Hove, to receive an account of the winding up by the liquidator, Mr. A. Jolley.

Blackpool Radio Installation Co., Ltd.—Winding up voluntarily. Liquidator, Mr. E. Rawcliffe, 29, Birley Street, Blackpool.

Moulding Developments, Ltd.—Winding up voluntarily. Liquidator, Mr. H. T. Ross, 1, Broad Street Place, E.C.

Wood Electric Fittings Co., Ltd.—Particulars of claims by October 16th to the liquidator, Mr. F. H. Agar, Pinner's Hall, Austin Friars, E.C.

Sherborne Electric Co., Ltd.—Meeting, October 17th, at Broad Sanctuary Chambers, 11, Tothill Street, S.W., to receive an account of the winding up by the liquidator, Mr. H. Fraser.

Dissolution of Partnership

Ajax Engineering, electrical engineers, 330, City Road, E.C.—Mr. W. J. Oliver and Mr. F. H. Favell have dissolved partnership so far as concerns Mr. Favell, who retires from the firm. Mr. Oliver will attend to debts.

Electricity Supply

Lighting, Domestic, Power

Ashley.—COMPULSORY WAYLEAVES.—A Ministry of Transport inquiry was held yesterday into an application made by the Central Electricity Board for compulsory wayleaves for overhead lines across parts of the parish of Ashley occupied by the Verderers of the New Forest, who up to the present have withheld consent to the erection of pylons in any part of the Forest.

Ashton-under-Lyne.—GENERATING STATION EXTENSIONS.—The Electricity Committee intends to borrow £2,773 for extensions to the generating station. This is a compulsory extension, the cost of which will be borne by the Electricity Commissioners, to provide for the erection of the switchgear necessary for connecting up with the grid system.

Australia.—LONDON OFFER TO PURCHASE WESTERN AUSTRALIAN PLANT.—Sir James Mitchell, the Prime Minister of Western Australia, in a recent speech on the Budget, told the Legislative Assembly that there was likely to be a deficit of £763,000. The manager of the State electric power plant was now in London, he said, to discuss an offer of the Power Securities Corporation to purchase the system. Either the Government must sell on favourable terms or face an expenditure of £1,400,000 within five years.—*Exchange Telegraph.*

Bacup.—NEW SWITCHGEAR.—The Town Council has applied for sanction to a loan of £3,000 for switchgear for a new substation at Waterbarn, &c.

Banchory.—STREET LIGHTING PROSPECTS.—The Grampian Electricity Supply Co. hopes to have the street lighting completed by the middle of next month.

Bishop Auckland (Co. Durham).—STANDARDISATION OF SYSTEM.—The Rural District Council is communicating again with the local electricity supply company for information regarding the cost of taking over the electricity supply and bringing the system into line with its standard system. The company previously informed the Council that it was awaiting certain information before it could give an estimate of the cost.

Bradford.—LOAN SANCTIONED.—The Electricity Committee has received sanction to a loan of £200,000 for electrical extensions during the next three years.

Brighton.—SPECIAL ORDER.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Corporation to supply electricity in part of the rural district of Cuckfield.

Buckie.—ELECTRICITY'S RAPID PROGRESS.—Since the introduction of electricity into Buckie a year ago the demand has more than trebled, and has necessitated the addition of a new 300-h.p. five-cylinder Diesel crude oil engine with generator, costing over £3,000.

Burton-on-Trent.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to the borrowing of £25,000 for mains, services and transformers.

MAINS EXTENSIONS.—Mains extensions are to be carried out at Milton (£300), from Horninglow Cross to Beam Hill (£290), and to the pottery works of Messrs. T. G. Green & Co., Ltd., at Church Gresley (£350).

Cannock.—SUPPLY TO HAZEL SLADE.—The Urban District Council has instructed the electrical engineer to prepare a scheme for extending the electricity supply to Hazel Slade.

Carlisle.—CHEAPER ELECTRICITY.—The following reductions in charges have been adopted:—Lighting flat rate sliding scale reduced from 5¾d. to 3¼d. per kWh, to 5d. and 3¼d. Prepayment meter supplies, from 5¾d. to 5d. per kWh. Power and heating flat rate sliding scale, from 2d. to 1¼d. per kWh to 1¾d. and 1¼d. Alternative maximum demand rate for lighting, from £10 to £7 5s. per kW, to £9 5s. and £6 10s., with the "unit" charge lowered from 3d. to 1¼d., to 2¾d. and 1d. On the domestic alternative rate the yearly fixed charge of 15 per cent. of the net rateable value will now only apply to the first £40 of the rateable value, and is reduced to 7½ per cent. for any excess above that amount. The charges for supplies outside the city are subject to an addition of 15 per cent. on the new scale.

STREET LIGHTING FOR ARTHURET.—The Electricity Committee has reached an agreement with the Arthuret Parish Council, Longtown, for the lighting of thirty-one street lamps.

Catterick Village (Yorkshire).—SUPPLY INAUGURATED.—An electricity supply was switched on for the village by the Cleveland and Durham County Electric Power Co., last Monday. Power is supplied from the generating station at Haverton Hill-on-Tees.

Chester.—SCHOOL HEATING.—The Education Committee proposes to build a school on the Lache Estate and has invited the Electricity Committee to submit proposals for heating the school by electricity.

Cockermouth.—A SUPPLY NEXT MONTH.—It is announced that the Mid-Cumberland Electricity Co. will in all probability make an electricity supply available to the town before the end of next month.

Continental.—RUSSIA.—A plan for the construction of a new power station in the Leningrad district has been presented by Professor Voyevodsky to the authorities. The principal rivers of the European part of the Soviet Union have their source in the Valdai district and new hydro-electric stations are to be built on the shores of the rivers Vytegra, Meta and Lovet. The largest is to be the Chosyuiginsk station at Damyansk which will have a capacity of 250,000 kW. The Valdai rivers are to be connected with the Volga and the new power stations are intended to supply not only Leningrad, but also Moscow, Ivanovo-Voznesensk and the western part of White Russia. The cost of these power stations is estimated at 500 million roubles.

FRANCE.—According to *L'Electricien*, the output of the fifty principal power stations in France, representing about 62 per cent. of the total French production, amounted during the six months ended June last to 4,326,081,823 kWh as compared with 4,660,018,283 kWh in the corresponding period of 1931. Of the total, hydro-electric plants were responsible for 2,369,987,928 kWh, and thermal and internal combustion engine stations for 1,956,093,895 kWh.

Coupar Angus (Perthshire).—STREET LIGHTING.—The Town Council is changing over from gas to electricity for street lighting.

Douglas (I.O.M.).—MAINS EXTENSIONS.—The Electricity Committee is to extend mains off Ballarnard Road at a cost of £230.

Dover.—GREYHOUND RACING SUPPLIES.—The Electricity Committee is to give a supply of electricity to Mr. A. Cadman for a new greyhound racing track at Buckland. The borough electrical engineer, Mr. R. C. Harpur, informed the Committee that the amount required would be equivalent to that needed for 300 small houses.

Edinburgh.—PUBLIC LIGHTING REPORT.—The Corporation Lighting Inspector, in his annual report, says that under the scheme whereby existing gas stair lights may be converted to electricity at a charge of £1 per light shared by the proprietors of the houses, 510 stair lights have been so converted during the period reviewed. The Lighting Committee had under consideration the conversion of gas stair lights to electricity generally by districts, but so far no definite decision has been arrived at.

Falkirk.—RESULT OF INQUIRY.—It is reported that the Electricity Commissioners have refused the Town Council's application for consent to the installation of additional generating plant in its works at an estimated cost of £19,000. This is the result of an inquiry held in Falkirk in June, when the Scottish Central Electric Power Co. opposed the application. Falkirk is among the cheapest suppliers in the country and this was emphasised at the inquiry. It is understood that negotiations are proceeding with the Commissioners as to the next legal step.

Glasgow.—MAINS EXTENSIONS.—The Electricity Committee has agreed to the laying of distributing mains at a cost of £1,945.

Great Yarmouth.—MAINS AND SERVICES.—The Town Council has received sanction to a loan of £30,000 for mains and services.

Hailsham.—ELECTRICITY FOR HOOE.—At a recent meeting of the Rural District Council, it was reported that the Hastings Corporation had been asked whether it would supply electricity to Hooe, its line being nearer than that of the Weald Electricity Supply Co., Ltd., which has the power to supply the parish. The Corporation had replied that it was willing to supply electricity to the Weald Co., but the latter must be responsible for distribution. It was intimated that the Weald Co. would have a supply available for the Herstmonceux district by the end of this month.

Hazel Grove and Bramhall.—LOANS.—The Urban District Council has decided to apply for sanction to loans of £1,000 for meters and £6,942 for mains in the Council's area proposed to be taken over from the Stockport Corporation.

Irish Free State.—COOKER-HIRING SCHEME.—The Electricity Supply Board has decided to let cookers out on hire in the 150 towns and villages served by its system. These cookers will be installed and maintained free of charge, and with each will be supplied a three-pint automatic safety kettle. The Supply Board has reduced the cooking rate from 1¼d. to 1d. per kWh.

Isle of Axholme.—EXTENSION OF SUPPLIES.—The Rural District Council has decided to meet representatives of the Yorkshire Electric Power Co., Ltd., with respect to extended supplies of electricity in the island. The clerk recently interviewed Mr. Crowther, representative of the company, and informed him that the proposal to supply Epworth and Crowle did not seem to the Council to meet the requirements of the whole of the island. Mr. Crowther intimated that the company had realised that, but difficulties had arisen owing to its having to form a separate private company, and it had thought it better to carry cables to the two chief places, Epworth and Crowle, first; it hoped to supply these places by next spring. A subsequent letter stated that estimates for an extension, *via* Belton, through Epworth, were to be submitted to the directors, and the Council was asked for particulars as to its requirements in other parts of the area.

Largs (Ayrshire).—ILLUMINATIONS.—The Town Council is carrying out a scheme of illuminations on the promenade and public buildings from September 22nd to October 3rd. The General Electric Co., Ltd., and the L.M.S. Railway Co. are co-operating in the scheme.

Lerwick.—INAUGURATION OF SUPPLY.—The new electricity supply was switched on last Saturday evening. The generating plant installed is of the very latest type and includes two three-cylinder 110-h.p. Ruston and Hornsby crude oil engines, each driving a 75-kW generator, and a battery. A large number of public buildings, private houses, offices and business premises have been connected up, and several other firms are now wiring their establishments. The total cost of the scheme is over £16,000.

London.—ST. PANCRAS.—The borough electrical engineer and manager has been instructed to prepare a scheme for the hire-purchase of electric fires, water heaters and cookers. It is proposed to borrow a sum of £3,000 in connection with the scheme.

The Electricity and Public Lighting Committee recommends the improvement of the public lighting in Camden Street at a total cost of £812, including mains extensions. It is also proposed to provide service mains at a cost of £790, and to extend e.h.p. transmission lines to Highgate and Grafton Road sub-stations at a cost of £5,330.

FULHAM.—In connection with the extension of the generating station the consulting engineers have now prepared a specification for the following works:—(a) Condensing circulating pumps and pipework; (b) main switchgear. These have been approved by the Electricity and Lighting Committee, which recommends that tenders shall be invited for the work.

Sanction is to be sought to the borrowing of £2,732 for the erection and equipment of the proposed new sub-station in Epirus Road.

The following loans have been sanctioned:—Mains and plant at the Beaconsfield Road sub-station, £2,253; house services, £15,000; meters, £10,000; rental wiring installations, £20,000; balance of the estimated expenditure on the extension of the generating station, £1,500,000.

STOKE NEWINGTON.—The Electricity Committee is to install free wiring in 171 houses at a cost of £891, and recommends a further expenditure of £2,000 on electric cookers for hire purposes.

Luton.—OVERHEAD LINES.—The Rural District Council has decided to offer no objection to the Luton Corporation's extension of the overhead lines in the Caddington, Shillington, and Challton areas by the Luton Corporation.

Mountain Ash.—CHEAPER ELECTRICITY.—The following revised scale of charges for electricity is recommended by the Electricity Committee:—Lighting flat rate: 3d. per kWh. Lighting through prepayment meters: 2½d. per kWh. Heating, cooking, and power: Less than 15 kWh per quarter, 3d. per kWh; 15 kWh and over, 2½d. Large power consumers and cinemas: First 500 kWh per quarter, 2¼d. per kWh; beyond, 2¼d. Special domestic rate (inclusive of cooker rent): First 100 kWh per quarter, 1.75d. per kWh; next 400 kWh, 1.25d.; beyond, 1.15d.; minimum quarterly charge of 12s. 6d. Special domestic rate (where no cooker is installed): First 500 kWh per quarter, 1.25d. per kWh; beyond, 1.15d.; minimum charge 8s. 4d. Alterations have also been made in the assisted wiring charges. A discount of ¼d. per kWh for prompt payment is allowed on lighting flat rate, heating, cooking, and power accounts, and ¼d. per kWh on the special domestic rates.

Neath.—LIGHTING FROM POWER METERS.—The large number of consumers stated to be abstracting electricity from the power meters and utilising it for private lighting purposes has led the local Rural District Council to take action, and at a private meeting it was decided to prosecute 53 of the offenders.

Persia.—ELECTRIFICATION OF TEHERAN.—A contract has been concluded between the Persian Government and a Brussels electrical company for the electrification of Teheran.

Portsmouth.—LOANS.—The Electricity Committee is to apply for sanction to loans of £5,000 for extensions to Catherington, £2,600 for a relief main, and £5,500 for switchgear and accessories.

NEW INSTALLATIONS.—Since April 1st the Electricity Department has made 1,639 new connections.

Reading.—INQUIRY.—A Ministry of Transport inquiry was held on September 14th and 15th into an application by the Central Electricity Board for consent to the erection of an overhead transmission line from Reading to Pangbourne. It was stated that 97 wayleaves were required, that 40 had been obtained by voluntary agreement, and that 57 remained to be obtained by compulsory wayleaves. The total length of the proposed line was 10¾ miles, and there were objections on the part of a number of landowners and by the Thames Conservancy, one on the question of amenities, two with regard to the danger of falling wires, and three as to the question of interference with navigation.

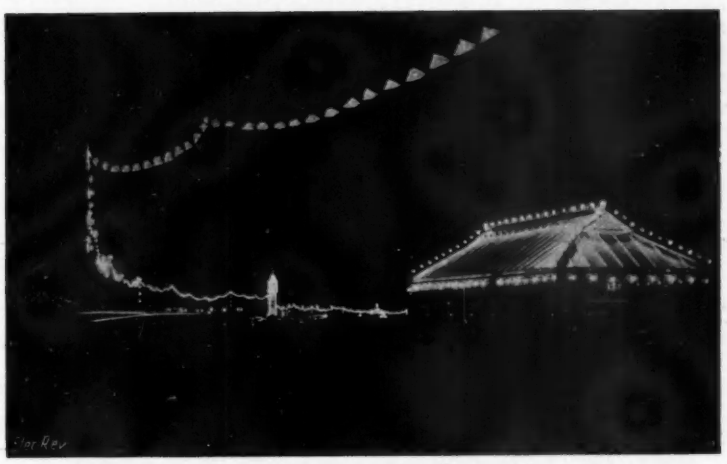
Ringmer.—EXTENSIONS.—The Ringmer & District Electricity Co., Ltd., is shortly to give a supply of electricity to Plumpton, Hamsey, Ringmer, Glynde, Alciston, Alfriston, and Litlington. The company has contracted to take a bulk supply from the grid at Asheham, and mains are to be extended to the new works of Cement Industries, Ltd., at Asheham.

South Africa.—NEW ELECTRICAL SCHEMES.—Strand Town Council has suggested to the Somerset West municipality that the two councils should embark on a combined electricity scheme. Frenchhoek has arranged a loan for a new electricity scheme, for which Mr. G. V. Adendorff, Cape Town, has been appointed consulting engineer.

Spalding.—REVISION OF TARIFF.—The Urban District Council has adopted the following revised scale of charges:—Lighting flat rate, 8d. per kWh in the urban area, and 9d. outside. Power, under 450 kWh per quarter, 3d.; over 450 and under 900 kWh, 2½d.; beyond, 2d. All-in domestic tariff, 2d. per kWh from March 26th to September 25th and 3d. at other times; where 2 kW or more of heating is installed and used, 1½d. per kWh from March 26th to September 25th, and 2½d. at other times (minimum consumption, 200 kWh per quarter). Where an electric cooker is installed and used, 1½d. per kWh all the year round, with a minimum consumption of 350 kWh per quarter. Business premises, £3 10s. per kW per quarter, plus 3d. per kWh consumed, plus the cost of a maximum demand indicator, but no meter rent. Meter rents: Over 50 kWh per quarter consumption, no charge; 25 to 49 kWh, 1s. 6d.; 10 to 24 kWh, 2s.; under 10 kWh, 5s.

Staindrop (Co. Durham).—CANVASS TO BE MADE.—A canvass is being taken to ascertain the demand for electricity.

Stornoway.—SUPPLY INAUGURATED.—At the power house of the Stornoway Electric Supply Co. on September 14th the electricity supply was formally switched on by Mrs. Norman Maciver, wife of the chairman of the company. The work in connection with the installation has been carried out in record time. It was only in the middle of April that the decision to float a company was made; work was begun at the power station on May 10th, the laying of the cables was started on June 20th, and a supply was available on August 27th. Ex-Provost Wittet, Elgin, as chairman of the Elgin Electric Supply Co., which held the contract for the installation of the Stornoway plant, called on Mrs. Maciver to switch on the supply and commented on the spirit of enterprise displayed by the public of Stornoway.



Decorative lighting at Weymouth by Benantee Illuminations

Taunton.—TWO-PART TARIFF INTRODUCED.—When the Town Council at a recent meeting gave approval to a two-part tariff system it was stated that there would then be no other town with five times the population that supplied electricity more cheaply than Taunton. The new tariff is based on a fixed annual charge of 9 per cent. on the gross rateable value of the consumer's premises with a "unit" charge of ½d. per kWh, inclusive of meter rent.

Tenterden.—REQUESTS FOR SUPPLIES.—The Rural District Council has decided to call the attention of the Electricity Commissioners to requests made to the Weald Electricity Supply Co., Ltd., for the extension of mains in the district, particularly with regard to Rolvenden Layne, which has asked for a supply for three and a half years without result.

Wallasey.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to the borrowing of £5,000 for alterations to the refractories of two combustion chambers.

FLOODLIGHTING OF BATHS.—Experiments in floodlighting at the new open-air bath at New Brighton are to be carried out by two firms of electrical engineers at an estimated cost of £50.

Wemyss Bay.—NEW SUPPLY.—Beginning this month the Skelmorlie Electric Supply Co., Ltd., is to serve Wemyss Bay.

Wetheral (Cumberland).—PUBLIC LIGHTING AT SCOTBY.—The electors of the village of Scotby, near Wetheral, are to hold a meeting to decide whether or not the village shall be illuminated by electricity.

Wolverhampton.—THE UPPER PENN CHANGE-OVER.—On October 1st the Electricity Department is to take over from the Midland Electric Corporation for Power Distribution, Ltd., that part of Upper Penn now included in the borough extension scheme. Generally speaking, the electricity charges under the Wolverhampton Corporation will be lower than formerly.

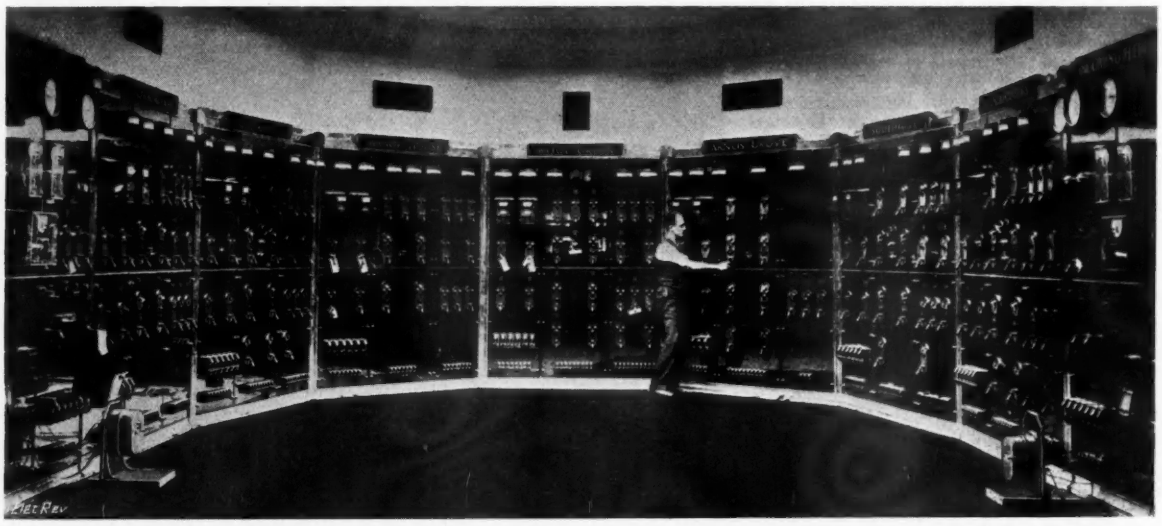
Traction

Hebburn-on-Tyne.—TRAFFIC SIGNALS.—The surveyor to the Urban District Council is to obtain further information from the Ministry of Transport before the Council decides to proceed with a scheme for the provision of automatic traffic signals at dangerous corners.

Irish Free State.—THE DRUMM BATTERY TRAIN.—The Drumm Battery train has made trips aggregating 230 miles in one day, beginning the day by leaving Bray at 7 a.m. for Amiens Street terminus, Dublin, and in succession doing three double trips to Greystones. Each double trip was sustained on a twenty-five minutes' battery charging at the terminus. One of the night runs from Bray to Dublin was done in twenty-eight minutes with seven stops at intermediate stations.

Sunderland.—NEW TRAMCAR IN SERVICE.—A new electric tramcar was recently put into service on the Corporation's tramway system, the first passengers including tramway managers from a number of provincial centres. Apart from the truck, the new vehicle has been entirely constructed in the Sunderland tramway sheds at an approximate cost of £2,500. The truck, which eliminates mechanical vibration to a large extent, was built by the Electro-Mechanical Truck Company from designs prepared by Mr. C. A. Hopkins, the borough tramway manager. Mr. Julius Fischer, inventor of the "bow" system as a substitute for the trolley, journeyed specially from Budapest to attend the function. He stated that Sunderland was the first town in England to convert entirely to his system, which had now been adopted by 125 tramway undertakings on the Continent.

York.—THE FUTURE OF THE TRANSPORT SYSTEM.—It is understood that an early decision will be reached on the future of the city's transport system. A committee of five members of the City Council which has been investigating the whole matter will probably recommend the Council to resume negotiations with the West Yorkshire Road Car Co., with a view to the co-ordination of the bus services of that company in and out of York with the tram and bus services of the Corporation.



The control room at Wood Green, from which the sub-station plant for the new Piccadilly line is controlled (see p. 420)

Communications

Canada.—LICENCES.—*World-Radio* says that in 1931 the number of licences for radio receiving sets issued amounted to 598,911, against 559,116 in 1930, and 390,130 in 1929. Ontario was the province issuing the greatest number in 1931, with 283,493, while Quebec came second with 125,152. The increase in Ontario, however, was only 180, while in Quebec it was over 24,000. There was an increase in the number of licences issued in every province except Prince Edward Island, Manitoba, and Saskatchewan. The biggest increase after Quebec was in British Columbia, this province also holding third position in the number of receiving sets licensed.

Great Britain.—RADIO EXCHANGES.—Douglas (I.o.M.) Highways Committee has declined to entertain a proposal submitted by Mr. W. Hallows for the establishment of a relay service.

The Portsmouth Town Council has decided to invite tenders for operating a relay service in the borough. The proposal was opposed by the Portsmouth and District Wireless Traders' Association on the ground that it would adversely affect its trade.

Sedgley Urban District Council has refused to grant an application by Wired Wireless, Ltd., for permission to install a relay service in the district.

Rediffusion, Ltd., has informed the Highways Committee that, owing to pressure of work, it cannot at the moment send a representative to discuss the question of relay services. The National Broadcast Relay Co. has applied for permission to establish a relay service in the city, and the town clerk has been asked to ascertain from the company the names of places where it has already installed such services.

NEW TELEPHONE EXCHANGES.—The existing manual exchange at Blagdon is to be replaced by a new exchange of the rural automatic type on September 27th.

A new exchange was opened on September 10th in Seymour Street, Dundee, and 800 subscribers on the Central Exchange were transferred.

"Liberty," the new automatic telephone exchange at Merton, was put into service on September 14th, 1,950 subscribers from the Wimbledon Exchange being switched over.

Holland.—THE NEW HILVERSUM TRANSMITTER.—Tests are now being made with the new transmitter recently completed at Hilversum, and it is hoped that the many complaints, especially from the southern parts of Holland, which have been made during the past two years will have no further justification. According to *World-Radio*, the new aerial mast is 465 feet high, and the most up-to-date crystal control system is in use. Although 20 kW is available, by a change-over system transmissions may be made on only 7.5 kW when it is considered that any particular transmission does not demand the greater power. The insulated mast is made of steel, held in position by insulated steel cables, and erected on porcelain insulators.

Irish Free State.—ATHLONE STATION NEARING COMPLETION.—It is expected that the new high-power broadcasting station at Athlone will be completed before the end of next month. Preliminary tests will be made on the present Dublin wavelength of 413 metres.

Liverpool.—WIRELESS POLE CHARGES.—As there has been considerable difficulty in collecting the charge of 1s. made to Corporation tenants who have erected wireless poles, the Housing Committee is to recommend the discontinuance of the charge.

New Zealand.—IMPROVING BROADCASTING SERVICES.—The *Wireless World* states that the Technical Committee appointed by the State Broadcasting Board to inquire into the best means of improving the service of the four stations at Wellington, Auckland, Christchurch, and Dunedin has recommended that these stations should be re-equipped and their power doubled—bringing Wellington 2YA up to 10 kW—and that the other three should act as 1-kW relay stations. Further relay stations may be provided by taking over some of the privately owned "B" stations. The problem of satisfactory broadcasting in the islands is somewhat difficult owing to the scattered nature of the population over the 1,000 miles from north to south. It is reported that there are now 75,000 receiving licences issued.

Oldham.—RADIO TO ASSIST POLICE.—Experiments have recently been carried out by the Chief Constable, Mr. A. K. Mayall, in transmitting radio messages from headquarters to police in motor cars.

Palestine.—NEW STATION.—A new broadcasting station operating on a wavelength of 456 metres has recently been completed at Tel-Aviv. A short-wave transmitter is to be added shortly.

Spain.—THE INTERNATIONAL RADIO CONFERENCE.—A proposal has been put forward by the British delegates to the International Radio Conference now being held in Madrid that broadcasting stations should reduce their power with a view to eliminating interference. It is suggested that broadcasting services "should be confined almost exclusively to national requirements."

The latest reports indicate that the wavelength question has reached a deadlock, owing to the attitude adopted by the Soviet delegates.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—SYDNEY.—October 24th. Department of Public Works. Auxiliary hydro-electric plant for Hume Reservoir. (A.X. 11487.)*

MELBOURNE.—November 22nd. Post and Telegraph Department. Accumulator cells and batteries. (A.X. 11491.)*

Berwick.—County Council. Electric lighting, &c., at Gordon Hospital extensions. Mr. R. G. Johnston, county clerk, County Buildings, Duns. (deposit £1 1s.).

Birkenhead.—October 4th. Mersey Railway Co. Electrical sundries, metallic and carbon filament lamps and fittings. Mr. J. W. Shaw, general manager and secretary, Central Station, Birkenhead.

Cleethorpes.—October 10th. Urban District Council. H.p. feeders, l.p. cables, switchgear, service boxes, prepayment meters, cut-outs, &c. (See this issue.)

Glamorgan.—October 8th. County Mental Hospital Committee of Visitors. Wiring and fittings for lighting and power at new admission block, convalescent home, nurses' hostel and medical officer's residence at Penyfai, near Bridgend. (See this issue.)

India.—NEW DELHI.—December 5th. Indian Stores Department. A.c. ceiling fans. (A.X. 11461.)*

October 25th. Bare copper conductors. (G.X. 11840.)*

SIMLA.—India Store Department. November 7th. Electric bulbs for signalling lamps and torches. Director-General, India Store Department, Belvedere Road, S.E.1 (deposit 5s.).

November 14th. Inert cells and dry batteries. Director-General (deposit 5s.).

London.—September 29th. Great Western Railway. Telegraph and electrical apparatus, &c. (September 16th.)

STEPNEY.—October 10th. Electricity Department. L.p. switchgear for Limehouse generating station. (See this issue.)

LONDON AND HOME COUNTIES JOINT ELECTRICITY AUTHORITY. October 8th. General electrical accessories. (See this issue.)

Mynyddislwyn.—September 30th. Urban District Council. Overhead and underground mains, kiosk, and sub-station switchgear. (September 16th.)

New Zealand.—WELLINGON.—October 26th. Post and Telegraph Department. Twenty-four dry electrolytic condensers of 500 mF capacity for use on a 40-V circuit. (A.X. 11478.)*

Northern Ireland.—BELFAST.—September 26th. Electricity Board for Northern Ireland.—Metering equipment. (September 16th.)

Oban.—October 7th. Town Council. 11-kV and l.p. overhead lines and road work. (September 9th.)

Portland.—September 30th. County Council. Electric lighting installation at police station. County architect, Dorchester.

Ramsgate.—September 26th. Town Council. Electrical apparatus for six months. Mr. H. G. Curtis, town clerk, Albion House.

South Africa.—JOHANNESBURG.—October 27th. City Council. Three-phase h.p. switchboard cubicles. (A.X. 11485.)*

October 20th. Electric cable. (A.X. 11501.)*

September 30th. Government Supplies Board. Electric motors.

DURBAN.—October 28th. City Council. 6,600-V metal-clad switchgear. (A.X. 11500.)*

Turkey.—ISTANBUL.—October 19th. Department of Posts, Telegraphs and Telephones. 40,000 metres of cable. (A.X. 11493.)*

Twickenham.—October 6th. Town Council. Electrically driven sewage pumping machinery and equipment with automatic control. Borough engineer and surveyor, Municipal Offices (deposit £2 2s.).

Woodford.—September 26th. Urban District Council. Traffic control installation. Surveyor, Council Offices.

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Brechin.—Town Council. Accepted. Electric lighting at housing scheme.—Walker & Stanley.

Douglas (I.O.M.).—Electricity Committee. Recommended. Water-tube boiler (£7,644).—Stirling Boiler Co., Ltd. Turbo-alternator (£9,575).—Brush Electrical Engineering Co., Ltd.

Government Contracts.—The following contracts were placed by the various Government Departments during August:—

ADMIRALTY CONTRACT & PURCHASE DEPARTMENT.

Junction boxes.—Hawkers; W. McGeoch & Co.; Engineering & Lighting Equipment Co.

Electric travelling crane.—J. Booth & Bros.

Electric lighting fittings.—Fairless Engineering Supplies Co.; G.E.C.; W. McGeoch & Co.; Gabriel & Co.; Player, Mitchell & Breedon; Oliver Pell Control.

Refrigerators.—British Automatic Refrigerators.

Switches.—Hawkers; W. McGeoch & Co.; Ediswan; G.E.C.; Engineering & Lighting Equipment Co.

Switchboards and spares.—Engineering & Lighting Equipment Co.

Electric overhead travellers.—Vaughan Crane Co.

WAR OFFICE.

Secondary battery.—Britannia Batteries.

Cable and line material.—G.E.C.

Overhead electric travelling cranes.—Cowans, Sheldon & Co.

Generators.—Electro-Dynamic Construction Co.

AIR MINISTRY.

Generators.—Haslam & Newton.

W/t valves.—G.E.C.

CROWN AGENTS FOR THE COLONIES.

Generating plant.—Ruston & Hornsby.

Telephone materials.—G.E.C.

POST OFFICE.

Telephonic apparatus.—Automatic Electric Co.; Ericsson Telephones; G.E.C.; Kerson Manufacturing Co.; Phœnix Telephone & Electric Works; Plessey Co.; Siemens; Standard Telephones & Cables.

Testing and protective apparatus.—Phœnix Telephone & Electric Works.

Battery charging sets.—New Pelapone Engine Co.

Cable.—B.I. Cables; Callender's; Concordia Electric Wire Co.; Connolly's (Blackley); Hackbridge Cable Co.; Henley's; Standard Telephones & Cables.

Secondary cells.—Britannia Batteries; Chloride Electrical Storage Co.; Hart Accumulator Co.; Pritchett & Gold & E.P.S. Co.

Loading coils.—G.E.C.; Siemens; Standard Telephones & Cables.

Condensers.—Muirhead & Co.

Telephone cords.—B.I. Cables; L.P.S. Electrical Co.

Insulators.—T. De la Rue & Co.; Doulton & Co.; Litholite Insulators; Taylor, Tunnicliff & Co.

Kiosks.—Carron Company.

Electric lamps.—British Electric Transformer Co.; B.T.-H.; Cryselco; G.E.C.; Siemens Electric Lamps & Supplies; Stella Lamp Co.

Rectifiers.—Ediswan; Westinghouse Brake & Saxby Signal Co.

Insulator spindles.—Bert Birk & Co.

Flameproof wire.—Erewash Electric Wire Co.; L.P.S. Electrical Co.; Macintosh Cable Co.; Reliance Electrical Wire Co.

Switchboard wire.—Concordia Electric Wire Co.

Replating and enlargement of battery, Hanley telephone exchange.—Alton Battery Co.

Cable manufacture, supply, drawing-in and jointing, Salisbury—Southampton.—Pirelli-General Cable Works.

Escalators and lifts.—G.P.O. (Mount Pleasant, E.C.): Waygood-Otis. G.P.O. (S.): W. Wadsworth & Sons.

Magnetic compass and repeater equipment, H.M. cable ship *Monarch*.—H. Hughes & Son.

Telephone exchange equipment.—Edinburgh trunk exchange: Siemens Bros. Willaston (Crewe area), Heswall (Cheshire): Ericsson Telephones. Liverpool trunk exchange: Standard Telephones & Cables.

Telephonic repeater equipment.—Belfast, Dublin, Fenny Stratford: Standard Telephones & Cables. St. Margaret's Bay: G.E.C.

London.—ISLINGTON.—Electricity Committee. Recommended. Installations under the rental and hire-purchase wiring schemes (schedule prices).—E. H. Finn; A. Newton; Highbury Electric Co.

FULHAM.—Electricity Committee. Recommended. H.p. switchgear for North End Road sub-station (£250).—Crompton Parkinson, Ltd.

ST. PANCRAS.—Electricity Committee. Accepted. Sub-station fuseboard (£99).—English Electric Co., Ltd. Fitting larger resistance to motor convertors at Arlington Road sub-station (£152).—General Electric Co., Ltd. Re-nickelling labyrinth and blading of turbo-generator (£150).—Brush Electrical Engineering Co., Ltd. Hot water boilers (£351).—George Nobbs, Ltd. Three 250-kVA transformers (£105 each).—Metropolitan-Vickers Electrical Co., Ltd.; Brush Electrical Engineering Co., Ltd.; Hackbridge Electric Construction Co., Ltd.

Portsmouth.—Electricity Committee. Accepted. Two 500-kVA 6,000/2,000-V transformers (£187 each)—Hackbridge Electric Construction Co., Ltd. Two 500-kVA 6,000/400-V transformers (£163 each) and two 500-kVA 6,300/220-V transformers (£163 each).—General Electric Co., Ltd. Three 100-kVA 6,000/400-V transformers (£62 each).—British Electric Transformer Co., Ltd. Cable.—Hackbridge Cable Co., Ltd. (£899); Johnson & Phillips, Ltd. (£127); Edison Swan Cables, Ltd. (£1,369). Kiosks, switchgear, &c., for 12 months.—English Electric Co., Ltd.

Swansea.—Electricity Committee. Recommended. Turbo-alternators (£133,644).—English Electric Co., Ltd. Steam-raising plant (£238,450).—International Combustion, Ltd.

Health Committee. Accepted. Electric vehicle battery (£157).—Chloride Electrical Storage Co., Ltd.

Swindon.—Electricity Committee. Accepted. Sub-station equipment and switchgear in connection with the change-over in the Rodbourne area (£1,127).—W. Lucy & Co., Ltd.

Forthcoming Events

Birmingham Electric Club.—Friday, September 23rd. Grand Hotel, Birmingham. 7 p.m. "The Works of the Birmingham, Tame and Rea District Drainage Board with special reference to the Electrical Equipment." Mr. M. J. Penford.

Electrical Power Engineers' Association (Southern Division).—Saturday, October 1st. Holborn Restaurant, W.C. 5.30 for 6 p.m. Annual dinner and dance.

Institution of Heating and Ventilating Engineers.—Tuesday, October 4th. Home Office Industrial Museum, Westminster, S.W.1. 6.45 p.m. "The Measurement in Relation to Human Comfort of Radiation Produced by Various Heating Systems." Dr. H. M. Vernon.

Rugby Engineering Society.—Wednesday, October 5th. Rugby. Presidential address. Dr. F. W. Carter.

Notes

The Grocers' Exhibition

At the Grocers' Exhibition in the Agricultural Hall, Messrs. Herbert & Sons, Ltd., are showing a range of entirely British-made "Lion" electric coffee mills. For a.c. the motor is of the repulsion-induction type, and a simple safety device disconnects it if the cutting edges come into contact with anything harder than coffee berries; this device takes the form of a mechanical "fuse," the drive being taken through a split pin which is just sufficiently strong to take the maximum allowable torque of the motor

The Uno Co. exhibits a new heavy duty coffee mill, working on the same principle as its smaller models, capable of grinding 6 lb. of coffee per min. The company also shows a sample mill for tasting purposes constructed so that the exact quantity of berry put into the hopper is delivered into the tasting cup, with no residue remaining in the mill. A ½-lb. capacity roaster is heated by a radiant spiral element. The berries are contained in a cylindrical hopper rotated by hand, and are protected from contact with the element by a wire-gauze guard.

Frigidaire, Ltd., shows new cabinets for the storage and display of quick-chilled products, particularly the quick-chilled fish which is now on the market. The company's standard compressor is used and maintains the temperature of the cabinet at below freezing-point. The G. A. Smith Co. has a novel all-British bacon-slicer with push-button control, which runs and stops itself. The motor has reduction gears giving a spindle speed of 60. A "middle" of bacon is sliced in 2½ min. and retains its shape unaltered after cutting. Burroughs Adding Machines put forward an improved cash register with electric drive; the National Cash Register Co., Ltd., also has a new electrical machine. O. D. Binger (Sales Aids), Ltd., exhibit electrically driven models for the show window.

Neon Lighting at the Stoll Theatre

Sir Oswald Stoll is having erected at the Stoll Picture Theatre, Kingsway, what is believed to be the largest installation of neon tubes so far carried out in Great Britain, comprising over 3,000 ft. of red and blue tubing. The installation comprises l.p. wiring dividing the building into three sections with a phase for each section, and approximately seventy transformers are used. These transformers are housed on the cornices and canopies with a view to minimising the use of h.p. cabling. They are fitted by l.p. wiring carried from boards connected in each phase. The installation is rated at 25 kW.

Appointments Vacant

Engineer or superintendent in charge of the Morecambe and Heysham distribution system.

Technical assistant for Norwich Electricity Department.

(See our advertisement pages to-day.)

Heston and Isleworth Illuminations

To celebrate the conferring of the status of borough on Heston and Isleworth, the town is to be illuminated for a week beginning to-morrow. About 6,000 coloured lamps in special holders will be used, necessitating the installation of 6,600 ft. of cable, and "Beeantee" Illuminations, Ltd., have been awarded the entire contract.

The Birmingham Electric Club

The 1932-33 session of the Birmingham Electric Club opens this evening (Friday) at the Grand Hotel, Birmingham, when Mr. M. J. Penford will read a paper on "The Work of the Birmingham Tame and Rea District Drainage Board, with special reference to the Electrical Equipment." Other papers to be read during the session are:—October 28th: "The Recording and Reproduction of Talking Pictures," by Mr. V. M. Roberts. November 25th: "A Review of Modern Power Station Design," by Mr. T. E. Boothby. February 24th: "Electricity Supply Co-ordination," by Mr. S. T. Allen. March 24th: "Modern Electrical Problems Dealt with Experimentally," by Mr. J. F. Driver. The ladies' night will be held on October 14th, the annual meeting on December 16th, the presidential address will be given on January 27th, and the annual dinner will take place on March 10th.

Society of Chemical Industry

The opening meeting of the Chemical Engineering Group of the Society of Chemical Industry will be held jointly with the London Section on October 3rd at Burlington House, Piccadilly, W.1, when the jubilee memorial lecture on "The Corrosion of Metals in Salt Solutions and Sea-Water," will be delivered by Dr. G. D. Bengough. The first independent meeting of the Group will be held on October 14th, when Prof. J. S. S. Brame will read a paper on "Colloidal or Coal-Oil Fuel."

Heating and Ventilating Engineers

The Institution of Heating and Ventilating Engineers commences its next session on October 4th with an autumn special meeting at which Dr. H. M. Vernon will read a paper on "The Measurement in Relation to Human Comfort of the Radiation Produced by Various Heating Systems." Papers to be read at the sessional meetings will include the following:—November 2nd: "Radiant Heat," by Mr. A. F. Dufton; December 7th: "Examples of Modern Heating, Ventilating and Electrical Installations," by Dr. Oscar Faber; January 4th: "Soil Heating by Electricity," by Mr. C. A. Cameron Brown. On February 8th the ordinary meeting will be held in the afternoon and the annual dinner in the evening.

The E.P.E.A. (Manchester Section)

The second annual dinner and dance of the Manchester Section of the Electrical Power Engineers' Association will be held on October 15th at the Grand Hotel, Piccadilly, Manchester, at 5.30 p.m. for 6 p.m. Tickets (6s. each) can be obtained from Mr. F. Killeen, hon. secretary, Organisation Sub-committee, 269, Rochdale Road, Bury, Lancs.

Faraday House Old Students' Dinner

The annual dinner of the Faraday House Old Students' Association will be held on October 21st at the Savoy Hotel, W.C., at 6.30 for 7 p.m., when Major C. E. Prince, O.B.E., M.I.E.E., president of the Association, will be in the chair.

I.E.E. Informal Meetings

The following programme of the informal meetings of the Institution of Electrical Engineers has been arranged for the 1932-33 session. The hour of meeting will be 7 p.m. in each case. The names of the members opening the discussions are given in parentheses.

October 24th: "The Future Prospect for Electrical Engineers" (The President, Professor E. W. Marchant); November 7th: "The Present Depression—Is Electricity the Way Out?" (Mr. J. F. Shipley); November 21st: "Loudspeakers" (Dr. N. W. McLachlan); December 5th: "Street Traffic Signals" (Mr. E. S. Perrin); December 19th: "House Wiring Simplification and Elaboration" (Mr. F. Raphael); January 9th: "Television" (Mr. H. J. Barton Chapple); January 23rd: "The Use of Electricity in Agriculture" (Mr. F. E. Rowland).

The E.A.W.'s Autumn Programme

The autumn programme of the Electrical Association for Women opens on October 1st with a conference at Birmingham of women demonstrators who hold the E.A.W. Grade I Diploma. This has been arranged by the Birmingham and Midlands Branch (hon. secretary Mrs. N. Griffiths) in co-operation with the Birmingham Electric Supply Department. Miss C. Haslett (director), Mrs. T. Williams (Birmingham Corporation), Mrs. E. D. Lockley (Shropshire, Worcestershire and Staffordshire E.P. Co.), and Mrs. Flack will open a discussion.

Electrical Equipment for Hairdressers

Safety is strongly emphasised by all exhibitors of electrical apparatus at the Hairdressers' Exhibition now being held at Olympia. In the permanent waving section, in addition to safety against shock it is necessary to provide precautions to avoid burning the scalp whilst heating the hair. Messrs. Calmon and Neate, Ltd., demonstrate the "Maier Moderne" system. The hair is curled from the tip to the head, and an air-cooling system is provided for the scalp whilst the hair is being heated. In Nagele's "Eureka" permanent waving machine the heaters and suspenders are moulded in "Bakelite." Henri Serventi, Ltd.'s "Permwell" models are interesting examples of sound electrical construction, double-pole switches being used with separate fuses on every heater and all metal parts are earthed. In the Belleville and Lister a.c. wavers, in addition to provision for earthing, the heaters are isolated from the mains by means of a transformer and operated at 25 V.

Eugene, Ltd., show a new floor-model hair dryer, improving their previous model-de-luxe. Messrs. Calmon and Neate exhibit a "Koker" dryer, which is silent in action, easily adjustable and takes up very little room. Nagele's "Eureka" suction dryer is now British made. H. E. Jarvis & Co. show a "Turbinator" dryer, which circulates the air through the hair and can be adjusted to any desired speed. The "Sundryette" dryer has radiant heat elements under the hood. A hand hair-dryer shown by the same firm is completely moulded in "Bakelite." The La Reine Co. shows a new model of its pedestal hair dryer, in which particular attention is paid to the balance of the motor fan to promote quiet running. All this firm's steamers and sterilisers are obtainable with electric heating. Electric heating is also used in the "Arnao" scalp steamer shown by Marchant, Hill & Co. The same firm shows a new "Wahl" automatic hair clipper for a.c. only, working at 6,000 vibrations per minute. Nagele's display "Plastolume" signs with raised glass letters on a dark ground, illuminated from the rear by incandescent lamps.

The exhibition remains open until September 29th.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

BAR-TEST ammeter.
C.E. (in a shield) shop window reflector.
ZENYTH incandescent lamps.
LUISANTE bed lamps.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Sir Charles A. Mander, a director of the Rees Roturbo Manufacturing Co., Ltd., has acceded to the request of the Wolverhampton Town Council in committee to allow his name to go forward to the November meeting as Mayor for the ensuing municipal year.

Mr. A. E. Brooks, general manager of the Ascot and District Gas & Electricity Co., Ltd., who has retired after 33 years' service, has been presented by the staff and employés with a set of gold and platinum studs and cuff links. The presentation was made on September 15th by Mr. W. A. Scott, chairman of the company, at the electricity works at Sunninghill. Mr. Brooks has accepted a seat on the board of directors, and his successor as manager of the electricity works is **Mr. F. Tyrell.**

Mr. J. Neil, assistant at the Lossiemouth power station for the past twelve years, has been presented with a suit-case and travelling rug upon his leaving to take up a similar appointment at Lerwick.

Mr. Walter H. Jones, area superintendent with the Potteries Electric Traction Co., was married at Eccleshall Parish Church on September 14th to Miss Dora E. Turner, of Eccleshall.

I.E.E. Scholarships.—The following scholarships have been awarded by the Institution of Electrical Engineers for 1932:—Ferranti scholarship, Mr. C. D. J. Statham, B.Eng.; Duddell scholarship, Mr. P. J. Rattue; Silvanus Thompson scholarship, Mr. W. E. Arnold; Swan Memorial scholarship, Mr. G. N. Davison; David Hughes scholarship, Mr. R. G. Armstrong; Salomons scholarship, Mr. J. S. Wright; War Thanksgiving Education and Research Fund (No. 1), grants of £50 each to Messrs. G. J. Scoles and T. H. Walker; Thorrowgood scholarship, Mr. B. O. Banks.

Mr. C. D. Falcke, A.M.I.E.E. has become a director of Importers & Distributors, Ltd., Devon House, 173/5, Great Portland Street, W.1, and is taking charge of the Electrical Department of the company, which is now making "IDL" gasfilled and other types of lamps.

Mr. W. A. Sycamore, who has held the position of sales manager with Messrs. A. G. Mumford, Ltd., and their associated company, Messrs. John Kirkaldy, Ltd., since 1926, has joined the sales organisation of Messrs. Davey, Paxman & Co. (Colchester), Ltd., who have recently purchased the business of Davey, Paxman & Co., Ltd. He will be attached to the company's head office and works at Colchester.

Mr. W. C. Jeary has been appointed electrical sales manager of Messrs. Falk, Stadelmann & Co., Ltd., but will still retain control of the company's showrooms.

Institute of Transport Premiums.—The Council of the Institute of Transport announces that it has made the following premium awards in respect of the session 1931-32:—The Institute triennial gold medal, Sir Lynden Macassey; railway (operating) gold medal, Mr. H. H. Mauldin; railway (engineering) gold medal, Sir Harold Hartley; road transport (passenger) gold medal, Mr. H. M. Wyatt; water transport (canal) gold medal, Mr. A. J. Pearson; Institute graduate silver medal, Mr. J. M. Powell.

Mr. F. L. Cater, A.M.I.E.E., A.M.I.Mech.E., is returning to this country from the United States to take up a position with the British and Foreign Machinery Co., Ltd.

Mr. G. A. Robertson, of Hale, Cheshire, has been appointed assistant sub-stations superintendent by the Belfast Corporation Electricity Committee, subject to confirmation by the City Council.

Major John Cameron, O.B.E., assistant superintending engineer, Post Office, Glasgow, is shortly to retire. He entered the service in 1886 and joined the engineering branch in 1899, passing through all grades until he reached his present position. He played an important part in telephone development in the West of Scotland, and during the war his technical and administrative abilities found scope in the Royal Corps of Signals, and he was awarded the O.B.E. (Military Division) for services in France.

Mr. C. H. R. Thorn, who for many years was manager in India for W. T. Henley's Telegraph Works Co., Ltd., has no doubt tackled many problems in his time, and that must be his qualification for producing the "Complete Crossword Reference Book" recently issued by the Syndicate Publishing Co., Ltd., at 5s. net. A copy which we have received shows that the author must have devoted much labour to this comprehensive work.

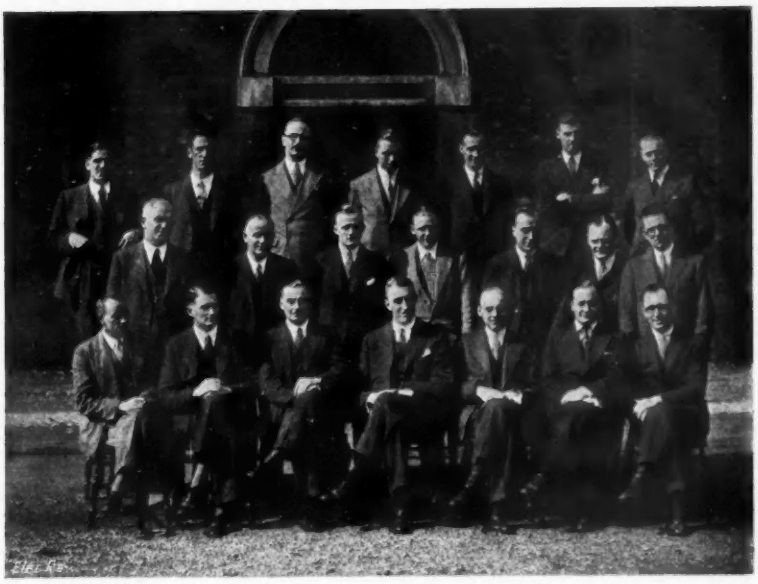
Mr. J. A. Harcourt, accountant to the Urban Electric Supply Co., Ltd., at Glossop, was recently married to Miss D. I. Howard, of Grantham.

Mr. W. A. Gillman, of the Chippenham staff of the Western Electric Supply Co., Ltd., who was recently married, was presented by the firm's employés with a cabinet of cutlery, and by the Chippenham staff with an electric clock.

Mr. Cyril Clarke, manager at Halstead, of the East Anglian Electric Supply Co., Ltd., was married on September 13th to Miss Florence M. Eaton, of Kesgrave. He was presented by the staff with an oak clock.

Col. A. S. Angwin, D.S.O., M.I.E.E., of the Engineer-in-Chief's office, G.P.O., has been appointed chairman at the International Telegraph Conference in Madrid, of the sub-commission which is studying the question of wavelengths.

Mr. Harold P. Williams has been appointed general manager of the Australian Broadcasting Commission which recently took over the Australian broadcasting services. Mr. Williams, who was chosen from 211 applicants, has been connected with the work since its inception, having joined the Sydney station soon after it started, and he has been acting manager since the Government took control on July 1st. His salary will be between £2,000 and £2,500 a year.



Cosmos Lamp Salesmen at Trafford Park

Left to right (back row): Messrs. Hall, Thompson, Vowler, Huckstepp, Emblin, Staines and Watts. (Middle Row): Messrs. de Viell, Davies, Turner, McChesney, Lock, Jackson and Reade. (Front Row): Messrs. Thomas, French, Chown, Everton, Willey, Young and H. G. Hall

Mr. A. E. Jepson, assistant district manager of the General Electric Co., Ltd. (Lancashire and Yorkshire District), gave an address on September 14th to the Rotary Club of Blackburn on "Electricity for Domestic Use." Very considerable interest was shown, the attendance being a record one.

Mr. A. J. Taylor has removed from 13, King's Avenue, Muswell Hill, N.10, to 24, Chalk Hill Road, Wembley Park, Middlesex. (Telephone, Wembley 1606.)

Mr. F. B. Allcock, whose marriage was reported in our issue of September 9th, informs us that his wife's maiden name was Margaret Williamson Izett—not Margaret Williamson as stated.

Mr. Arthur Dixon, B.Sc., A.M.I.E.E., who until recently was a partner in the firm of Walter Dixon & Co., consulting engineers, Glasgow, has joined the staff of the Craigpark Electric Cable Co., Ltd., Glasgow.

Mr. J. W. Perkins has been appointed transformer sales manager by the Foster Engineering Co. as from October 3rd. His headquarters will be at the company's head office, Wimbledon.

During the first day's proceedings of the annual conference of women engineers, which was held at Southampton under the auspices of the Women's Engineers Society from September 16th-19th, a discussion took place on "Careers and Openings for Women in Engineering," in which a number of ladies connected with the various branches of the engineering

industry took part. Among these were **Miss C. Haslett,** who made a general survey of the subject; **Miss M. M. Partridge,** who dealt with electrical engineering; and **Miss N. E. Miller,** of the Edison Swan Electric Co., Ltd., whose contribution to the discussion covered technical publicity.

Mr. W. P. McGeoch was married at Knowle on September 16th to Miss Margaret Thornton. Mr. McGeoch is the only son of Mr. and Mrs. William McGeoch, and is connected with W. McGeoch & Co., Ltd. He is also a member of the management board of the Birmingham Section of the British Industries Fair.

Mr. W. Dance has recently resigned the position of municipal electrical engineer at Humansdorp, South Africa, and it is understood intends to settle in England. According to the *South African Engineer & Electrical Review*, the position has been filled by **Mr. D. H. Hilton,** formerly branch manager of Messrs. C. E. Scott, Ltd., of Port Elizabeth.

Obituary

M. Louis Lacarrière.—The death is announced from Paris, at the age of 50 years, of M. Louis Lacarrière, the managing director of the Compagnie des Lampes and the president-elect for 1932-33 of the French Syndicat des Fabricants Français des Lampes Electriques.

Mr. R. H. Ballard.—The death is reported at Los Angeles on August 24th of Mr. Russell H. Ballard, president of the Southern Californian Edison Co., Ltd., at the age of 57 years. For seven years prior to his going to Los Angeles, 35 years ago, Mr. Ballard was with the Thomson-Houston Electric Co., in Chicago, and its successor, the General Electric Co. His death follows that of Mr. J. B. Miller, founder and chairman of the Company, which occurred a few months ago, and leaves vacant the two principal offices of that organisation.

Mr. F. H. Fiford.—The death is announced, at the age of 48 years, of Mr. Frank Horace Fiford, who was in business as an electrical contractor at 360a, Upper Richmond Road, East Sheen, Surrey. He was trained in his father's electrical business at Southampton, and commenced his own concern at East Sheen in 1907. The business will be continued on behalf of his widow.

Mr. H. D. Yeoman.—The sudden death is reported in Johannesburg on August 1st of Mr. H. D. Yeoman, of Bristol, who for the past few years had been in charge of the local branch of the Metropolitan-Vickers Electrical Export Co., Ltd.

Mr. V. G. Lironi.—We regret to record the death of Mr. V. G. Lironi, which occurred at Maidstone on September 12th; he was 66 years of age. Mr. Lironi was engineer to the Portsmouth Corporation tramways from 1902 until his retirement in 1931. He served his apprenticeship at Homerton with the Electrical Locomotive and Power Co., and in 1883 he equipped the power station and ran the cars of the first electric railway in this country, between Stratford and Manor Park. This was contemporaneous with Volk's Electric Railway at Brighton. Later Mr. Lironi was appointed works manager to the Epstein Electric Accumulator Co., of Hammersmith, and subsequently became head of Lironi & Bowman, Ltd., electrical engineers, at Bow. Retiring from that company, he held the successive positions of manager of the Sheffield Electric Light & Power Co.'s works, and manager of Moon, Loughlin and Co., of Manchester. From Manchester he went to Portsmouth as outside superintendent engineer for the British Insulated Wire Co., of Prescot, Lancs, where he laid the mains for the tramways. He became chief assistant to Mr. E. Rutter, the consulting engineer to the Portsmouth tramways, and in 1902 he was appointed resident tramway engineer, a position which he held until his retirement. The interment took place at Chichester cemetery on September 15th.

The late Mr. V. G. Lironi

Wills.—Sir John Ferguson, K.B.E., M.P., a director of the India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and of Indeuram, Ltd., left estate of the gross value of £35,823 (net personalty nil).

Mr. Charles Forster, of Chester-le-Street, electrical engineer, left £7,866 gross (net personalty £7,635).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Magnacore, Ltd.—Private company. Registered September 13th. Capital £2,100 in 2,000 10 per cent. cumulative preference shares of £1 and 2,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers and producers of transformers, chokes and like articles, electrical apparatus and appliances, and to acquire a patent relating to a metal alloy used for magnetic purposes and the trade mark when granted of "Magnacore" applied thereto. The subscribers are: E. J. R. Potter, 8, Great Winchester Street, E.C.2; and L. E. Stokes, 99, Cowley Road, Cranbrook, Ilford. Secretary (pro. tem.): E. R. Mellor. Solicitors: E. R. Mellor & Co., 8, Great Winchester Street, E.C.

E. M. F. Electric Co. Pty., Ltd. (incorporated outside Great Britain).—Particulars filed on September 9th, pursuant to Section 344 of the Companies Act, 1929. The company was incorporated in Victoria, Australia. The British address is at South Africa Pavilion, Wembley, where A. R. Moon is authorised to accept service of process and notices on behalf of the company. The directors are: J. M. Carroll, C. A. Holmes and J. T. Edmunds, all of Melbourne; R. A. Holland, of North Carlton, Victoria; and G. A. Whiting, of Hawthorn, Victoria. The memorandum and articles of association will be lodged with the registrar when received from Australia.

J. P. Tubular Heater Co., Ltd.—Private company. Registered in Edinburgh on September 14th. Capital £2,500 in £1 shares. Objects: To carry on the business of designers and manufacturers of and dealers in electrical or other fires, heaters, radiators, appliances for heating, cooking, &c. The directors are: R. A. F. Jackson and J. D. Place, both of 37, Otago Street, Glasgow; J. Hepburn, Roseneath, Clydesdale Road, Mossend, Lanarkshire; and J. Jardine, Bickleigh, Uddingston, Glasgow. Secretary: W. J. Wilson. Registered office: Clyde Crane Works, Mossend, Lanarkshire.

Mitchell Electric Co., Ltd.—Private company. Registered September 14th. Capital £500 in £1 shares (250 6 per cent. preference and 250 ordinary). Objects: To carry on business as manufacturers of and dealers in domestic electrical cooking, heating, lighting and ventilating apparatus, &c. The first directors are: W. R. M. Mitchell, 40, Oaklands Avenue, Harborne, Birmingham; and E. Woolley, 22, Southlands Road, Moseley, Birmingham. Registered office: 5, Edmund Street, Birmingham.

Philco Distributors (Lancashire), Ltd.—Private company. Registered September 19th. Capital £5,000 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and dealers in all kinds of electrical and other instruments, appliances, materials, supplies and components in connection with wireless telegraphy, &c. The directors are: F. Grindrod and R. Hardman, addresses not stated; J. H. Lord, Beechwood, Rochdale; Mrs. L. Grindrod, Holmedene, Bury Road, Bamford, Rochdale. Secretary: Mrs. L. Grindrod.

Priory Radio, Ltd.—Private company. Registered September 19th. Capital £500 in £1 shares. Objects: To carry on the business of electricians, radio and electrical engineers, &c. The directors are: M. H. Bligh and C. O. Stringer, both of Athlone, Bayham Road, Sevenoaks. Registered office: 41, Mount Pleasant, Tunbridge Wells.

Mavis Radio Manufacturing Co., Ltd.—Private company. Registered in Edinburgh on September 11th. Capital £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and wholesale or retail dealers in wireless transmitting and receiving sets, &c. The subscribers are: J. Cornwall, 161, Curzon Street, Glasgow; and W. G. Bruce, 132, West George Street, Glasgow. Secretary: J. Cornwall. Registered office: 77, Woodside Terrace Lane, Glasgow, C.3.

A. Wade & Co. (Burnley), Ltd.—Private company. Registered September 15th. Capital £2,000 in £1 shares. Objects: To acquire the business of manufacturers and distributors of "Decee-Acee" wireless receivers carried on by A. Wade and W. Moore at 9, Carlton Road, Burnley. The first directors are: A. Wade, 9, Carlton Road, Burnley; W. Moore, 6, Burnley Road, Padiham; and F. Helm, 40, Sabden Road, Padiham. Solicitors: Waddington & Son, 9, Grimshaw Street, Burnley.

Requirements Electrical and Engineering, Ltd.—Private company. Registered September 16th. Capital, £500 in £1 shares. Objects: To carry on the business of electrical, mechanical and hardware engineers and importers, exporters, agents, manufacturers, &c. The subscribers are: W. H. Miller, "Pegwyn," The Green, Hampton Court; and F. C. Miller, "Ivydene," Sunnyhill Avenue, Highams Park. Secretary: W. H. Miller. Registered office: 386, Old Street, E.C.1.

Wilkinson Radio & Musical, Ltd.—Private company. Registered in Edinburgh September 12th. Capital £100 in £1 shares. Objects: To carry on the business of radio and television agents and dealers, &c. A. H. Wilkinson, The Birches, Kilmarnock Road, Whitecraigs, is the first director. Registered office: 67, Hope Street, Glasgow, C.2.

J. W. R. Williams, Ltd.—Private company. Registered September 14th. Capital £100 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, suppliers of electricity, &c. The directors are: J. W. R. Williams and Olive G. Williams, both of 19, Creighton Road, N.W.6.

Duo-Mains Radio, Ltd.—Private company. Registered September 14th. Capital £500 in £ shares. Objects: To carry on the business of manufacturers of and dealers in wireless transmitting and receiving sets and parts, electrical apparatus, &c. The permanent directors are: A. R. Hammond-Heath and A. B. Hammond-Heath, both of 67, Walker Drive, Leigh-on-Sea. Secretary (pro tem): A. G. Willis. Registered office: 14, Cranbrook House, Cranbrook Road, Ilford.

Returns of Electrical Companies

Erskine, Heap & Co., Ltd.—Capital, £50,000 in 10s. shares. Return dated April 7th, 1932. 46,489 shares taken up. £4,413 paid on 8,826 shares. £18,831 10s. considered as paid on 37,663 shares. Mortgages and charges, nil.

Alliance Electrical Co., Ltd.—Capital, £10,000 in £1 shares. Return dated April 8th, 1932. 3,854 shares taken up. £1,927 (10s. per share) paid. £1,927 (10s. per share) considered as paid. Mortgages and charges, nil.

Bromley-Langton Electric Wire & Insulator Co., Ltd.—Capital, £2,000 in £1 shares. Return dated February 26th, filed May 6th, 1932. 1,500 shares taken up. £902 paid. £598 considered as paid. Mortgages and charges, nil.

Westward Electrical Co. (1928), Ltd.—Capital, £3,000 in £1 shares. Return dated May 13th, 1932. 2,235 shares taken up. £735 paid. £1,500 considered as paid. Mortgages and charges, nil.

West Hampshire Electricity Co., Ltd.—Capital, £30,000 in £1 shares. Return dated May 19th, 1932. All shares taken up. £30,000 paid. Mortgages and charges, nil.

Electric & Radio Supplies, Ltd.—Particulars filed of debentures for not more than £600, authorised June 30th, 1932, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £600.

Charles H. Champion & Co., Ltd.—Satisfaction to the extent of £7,110, on November 17th, 1931, of debenture dated February 18th, 1931, and registered Feb. 20th, 1931. (Notice filed September 13th, 1932.)

Llanidloes Electric Light Co. (1926), Ltd.—Capital, £5,000 in £5 shares. Return dated May 23rd, 1932. 485 shares taken up. £2,185 paid, £240 considered as paid. Mortgages and charges: None registered.

Resisto Electric Wire & Tape Co., Ltd.—Capital, £500 in £1 shares. Return dated January 13th, 1932. All shares issued and fully paid up. Mortgages and charges, nil.

Albany Accumulators, Ltd.—Capital, £1,000 in £1 shares. Return dated September 29th, 1931 (filed May 25th, 1932). 206 shares taken up. £202 paid, £4 considered as paid. Mortgages and charges, nil.

S. G. Leach & Co., Ltd.—H. A. Hann, 27, Theobald's Road, Leigh-on-Sea, was appointed receiver and manager on September 1st, under powers contained in debenture stock dated November 5th, 1926.

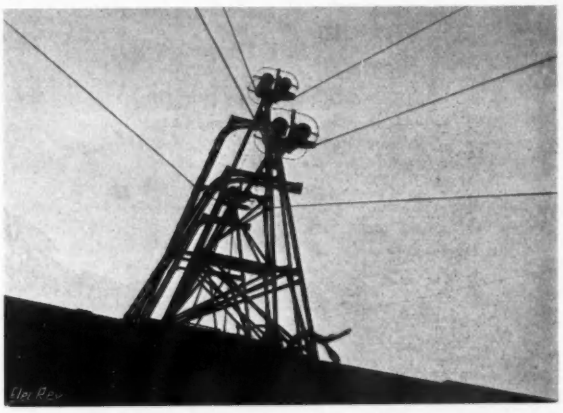
Dowsing Radiant Heat Co., Ltd.—Letter dated July 18th, undertaking to give a charge in a certain event on lease of offices, ground floor and basement of 91-3, Baker Street, W.1, to secure £250. Holder: A. Mackenzie, The Hollies, Beckenham Lane, Bromley.

Amps, Ltd.—Debenture dated August 19th, to secure £300, charged on the company's property, present and future, including uncalled capital. Holder: W. Harris, 133, Nightingale Road, Carshalton.

City Notes

Ferranti, Ltd., held their annual meeting on September 16th, Mr. V. Z. de Ferranti (chairman) presiding. In presenting the report and accounts (ELEC. REV., September 16th, page 413) the chairman said that while the turnover of the business had been maintained, it had not been possible to entirely avoid the effects of the continued world-wide trade depression, and consequently there had been a reduction of the trading profit both in England and Canada. Turning to the balance sheet, Mr. Ferranti said that the increase of £11,560 in the item "Land and Buildings" was due to the provision of new buildings at Hollinwood to accommodate work hitherto done in rented premises at Stalybridge. Plant, machinery, tools, &c., showed an increase of £100,300 due to the improvement and enlarging of their manufacturing facilities. The liabilities side of the balance sheet showed an increase of £103,834 in the issued capital at £800,000, the increase being the amount of additional capital provided by the issue of 103,834 seven per cent. preference shares (at par). They had used £2,392 of the contingency reserve provided last year to meet a loss in exchange on bank deposits, &c., in Australia, leaving a balance of £2,608, which would more than cover their future requirements in this connection. While this was only the twenty-seventh annual meeting of the present company, it had a particular interest since it was the fiftieth anniversary of the foundation of the company by Dr. S. Z. de Ferranti in 1882. They had on the board to-day Mr. Kolle, who was with the company at its commencement. A large part of the contracts entrusted to them by the Central Electricity Board had been successfully completed, and they had in operation nearly 2,000,000 kVA of power transformers working at 132,000 V and in sizes up to 60,000 kVA each. The metering equipment which they were making for measuring the supplies to and from the grid in South-East England was installed in a large area and was now recording between 3 and 4 million kWh per day. Recently they had designed and put on the market a seven-valve superheterodyne radio receiver for which there was a considerable demand. In his opinion, during the coming winter, owing to the number of high power Continental stations on the air, only superheterodyne receivers would be able to provide the necessary selectivity. Their experience and equipment placed them in a very favourable position for producing such a set in quantities. Their radiant fires were increasing in popularity, and there was a steady demand for electric clocks which he felt would increase considerably when the public realised their worth.

The International Telephone & Telegraph Corporation announces gross earnings of $36,527,075 for the six months ended June 30th, 1932, against $47,963,223 for the corresponding period last year. Operating expenses were reduced to $30,974,982, compared with $37,333,431, and net earnings totalled $5,552,092 against $10,629,792. The half-year's trading resulted in a consolidated net loss of $254,673 (approximately 4 cents per share on the 6,399,352 shares outstanding as at June 30th, 1932), as compared with a consolidated net income of $5,440,294 for the first half of 1931. While further substantial reductions were effected in operating expenses, gross revenues continued their decline, although the telephone operating companies have approximately maintained their gross earnings. Continued pressure for economies by Governments and other large customers resulted in a reduction in sales by the manufacturing companies.



The Dagenham tower of the Thames Grid Crossing—a photograph taken from a girder immediately below the cross arms. (Other pictures appear on pages 426 and 427)

The Sun Electrical Co., Ltd., reports that for the year ended April 30th last there was a record turnover, but owing to the continued world-wide depression and keen competition the net profit was reduced from £18,504 to £17,426. After providing for directors' fees, income-tax reserve, &c., it is proposed to pay a final ordinary dividend of 2½ per cent., making 5 per cent. for the year (against 7½ per cent.). This will absorb the same sum as last year, as a larger capital ranks for a full year's dividend. The amount carried forward is £6,664. Meeting: September 28th.

The British Aluminium Co., Ltd., states, in announcing the half-yearly dividend on the 6 per cent. cumulative preference shares, that it has been decided to await the full year's trading results before consideration of a payment on the ordinary shares. No ordinary interim was declared last year, but 5 per cent. was paid at the close of the year.

Buenos Aires Lacroze Tramways Co.—At a meeting of the three classes of debenture holders held on September 15th the scheme of arrangement was duly sanctioned.

The Ransome & Marles Bearing Co., Ltd., proposes to pay a dividend of 5 per cent., less tax, for the year ended June 30th last.

Callender's Cable & Construction Co., Ltd., has declared an interim dividend of 5 per cent. (unchanged).

British Insulated Cables, Ltd., has declared an interim dividend of 5 per cent. on the ordinary shares (same).

The International Automatic Telephone Co., Ltd., has announced an interim ordinary dividend of 3¾ per cent. (same).

Stocks and Shares

TUESDAY EVENING.

THE reaction in the prices of Stock Exchange securities, as well as those of commodities and base metals, which was the principal theme of last week's article, has been succeeded by mild recovery in the departments mentioned. In the Stock Exchange, the gilt-edged prices have gone ahead, led by a rise in the price of the 5 per cent. War Loan assented stock. This, which was down to 97 at the beginning of August, is now 3¾ higher. The flatness which seized upon the American market, and which made its influence severely felt in the prices of utilities, has continued in evidence. Amongst British Industrials, electrical equipment and manufacturing shares are harder, on balance. Business, while spasmodic, is tolerably active. People are spending more money in various directions, and the springs of enterprise are beginning to show rather more activity.

The rise in the price of petrol and the apprehension of a strike of busmen, led to Underground Electric ordinary going back to 17s., but upon the strike trouble being settled, the shares regained their previous figure of 17s. 6d. Metropolitans rose to 63, and Districts remained unchanged at 61½. The opening of the Piccadilly Railway's extension on the Monday in this week, with five new stations, had no effect from the market point of view.

Electricity Supply Shares

No changes of importance have occurred in the list of shares in the London electricity supply group. The market remains very hard, and the reaction which occurred in the Stock Exchange, at the early part of the week, failed to influence

prices in this particular section. The provincial shares are equally steady. Amongst some of those which are not quoted in our tables, it may be of service to mention that Isle of Thanet ordinary stand at 20s. 7½d., and the 6 per cent. participating preference at 26s. 3d. Llanelly and District ordinary shares are better on the week at 17s. 6d. Chiswick ordinary, of which the 5,000 shares lately on offer at 37s. 6d. have all been taken, are up to 38s. Hendon Electric have risen to 4 1/16 on the increase in the dividend. Of the lately issued shares, County new ordinary stand at 7s. premium.

Indian and Colonial Electrics

Calcutta Electric Supply shares are a little easier at 47s. 3d., which is a shilling higher than the price of Cawnpore ordinary. Madras Electric Supply maintain their strength at 31s. 3d. Melbourne Electric keep steady at 105. East African Light and Power shares are a trifle lower at 28s. 3d. Burma Electric Supply firmed up to 7s. 6d.; the preference are quoted at 15s. Victoria Falls ordinary are a good spot at 72s. 6d., showing 1/16 rise.

Electric Finance & Securities ordinary shares are 47s. 6d., and the 7 per cent. preference 28s. British Power and Light preference went ex dividend on Monday in this week, the deduction leaving the price at 23s., the ordinary shares being 14s. 10½d.

Cables and Wireless

Cables and Wireless stocks have come to be regarded as a useful speculative medium, and the prices go up and down in consonance with the tendency which happens to be prevailing at the time in the markets for speculative issues. This week, therefore, the tendency has been dull, and the prices of the three stocks, preference and both ordinary stocks, are ½ down in each case. Anglo-American Telegraph preferred strengthened to 103½, and Marconi Marines are a good market at 30s. 9d. Globe Telegraph and Trust ordinary and preference have both given way in sympathy with the reaction in Cables and Wireless. Oriental Telephone retain their improvement at 55s. Baird Television shares have dropped to 2s. 3d.

Dollar Stocks

This time last week one of the Stock Exchange features was the severe shake-out which had taken place in the prices of American utilities and other dollar stocks. A reaction occurred from the lowest figures touched, but the high levels of a fortnight ago have been by no means recovered. American Telephones, for instance, which were up to 172½, are now 156½, and International Telephones, from being 21 a fortnight ago, are back to 17½. British Columbia Power "A" shares at 32 are unchanged, and the "B," after touching 9¼, went back to 7. Power Corporation of Canada shares, on the other hand, are 2 down at 18, and Shawinigans fell 2 points to 22¼. Hydro-Electrics at 10½ are easier. Of the Mexican issues, the rise of 3 in Mexico Tramway 5 per cent bonds has been followed by a further gain of 13 points to 43½. Mexican Light and Power first bonds are, however, 2 down at 65½. Brazilian Tractions are a shade lower on the week.

The International Telephone and Telegraph Company notifies a net loss for the half-year of $254,000.

Manufacturing and Equipment Shares

British Insulated Cables announces an interim dividend on the ordinary shares of 1s., less tax, payable on the last day of this month. Callender's Cable is going to pay the same amount, as the interim dividend on its ordinary capital. Both these are the same as the rates distributed a year ago. Anticipations of increased orders as a result of the Central Electricity Board's activities have not been fully realised up to the present. The companies are finding, however, that fresh areas of supply are steadily opening, and the outlook for the industry as a whole may be described as healthy.

The changes of prices in shares are mostly upwards. Crompton Parkinsons are better at 21s. 3d. Telegraph Constructions at 10¾ are 5s. to the good. Henley's preference have gained 5s. at 5¼. Ferranti preference at 24s. 6d. are 9d. higher, a pleasant tribute to the fiftieth anniversary of the foundation of the company, which occurred in 1882. The annual general meeting of Ferranti was held a few days ago, when the dividend of 6 per cent., less tax, on the ordinary shares was approved, and the chairman had interesting information to give in connection with the operations of the undertaking. He said, incidentally, that there was a steady demand for electric clocks, and the ordinary householder will note this with interest, wishing, perhaps, at the same time, that the clocks could be made available for all electric lighting systems. Edison Swan first preference eased off to 22s. 9d., and British Aluminiums at 25s. 9d. have lost part of their previous jump. The International Automatic Telephone Company has declared a dividend on its ordinary shares of 3¾ per cent., the same as that of a year ago.

Miscellaneous Matters

Babcock & Wilcox, in the iron and steel group, rose to 47s., showing a gain of 9d., while Vickers have revolved around 7s. 3d. for some days past. There is no particular feature in the rubber share market, prices and business alike being exceedingly quiet. Trade throughout the Stock Exchange is spasmodic, but the bogy of possible Franco-German friction, which had a depressing effect last Monday week, was superseded by the development, twenty-four hours later, of a more hopeful sentiment.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1930.	1931.	Price, Sept. 20.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	70/–	—	4 5 9
Brompton Ordinary	1	8½	8½	31/6	—	4 9 0
Central Electricity 4½% Deb.	Stock	4½	4½	102½	—	4 7 10
Charing Cross Ordinary	1	8½	8½	32/–	—	4 7 6
Chelsea	1	8½	8½	32/–xd.	—	4 7 6
City of London	1	10	10	41/3xd.	—	4 16 10
Clyde Valley	1	8	7	31/3	—	4 9 7
County of London	1	11	10½	47/6	—	4 8 5
Edmundsons' 7% Pref.	1	7	7	29/–	—	4 16 7
Elec. Dis. Yorkshire	1	9	9	39/6	—	4 11 1
Elec. Supply Corporation	1	11	11	52/6	—	4 3 10
Kensington Ordinary	1	8	8	32/6	—	4 6 2
Lancs. Light and Power	1	6½	7	28/9	—	4 17 5
London & Home Counties 4½% Deb.	Stock	4½	4½	106½	—	4 4 6
London Electric	1	9	9	32/–	—	4 7 6
Metropolitan	1	10	10	46/3	—	4 6 7
Midland Counties	1	7	7	32/6	—	4 6 2
Mid. Elec. Power	1	8	8	33/9	—	4 14 9
Newcastle-on-Tyne Ordinary	1	6	6	26/3	—	4 11 5
Do. 7% Pref.	1	7	7	31/–	—	4 10 4
Northampton	1	10	10	45/9	—	4 7 4
Notting Hill 6% Pref.	10	6	6	12½	—	4 16 0
North Met. Elec. 6% Pref.	1	6	6	28/–	—	4 5 9
St. James' and Pall Mall	1	8	8	31/–	—	4 10 4
Scottish Power	1	8	—	32/6	—	4 18 6
South London	1	8½	8½	33/–	—	4 10 0
Urban Ordinary	1	7	—	29/6	—	4 15 0
Westminster Ordinary	1	8½	8½	31/6	—	4 19 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	18/9	+⅛	8 0 0
Yorkshire Elec.	1	8	8	38/9	—	4 2 6

HOME RAILS.

Central London Ord. Assented	Stock	4	4	81½	—	4 18 2
Metropolitan	,,	3½	2½	63	+1	3 19 4
Do. District	,,	5	4½	61½	—	7 6 3
Underground Electric	1	8	7	17/6	—	8 0 0

TELEGRAPH AND TELEPHONES.

American Tel. & Tel.	$100	9	9	156½	−6	5 15 0
Anglo-Am. Tel. Pref.	Stock	6	6	103½	+1	5 16 0
Do. Def.	,,	1½	1½	25½	—	5 17 8
Cables & Wireless 5½% Pref.	,,	5½	2¾	70	−½	3 18 7
Do. A 7½% Ord.	,,	—	Nil	21½	−½	—
Do. B ord.	,,	—	Nil	11½	−½	—
Globe Tel. and T. Ord.	10	8½	Nil	8½	−½	—
Do. do. Pref.	10	6	6	10¾	−¼	5 11 7
Great Northern Tel.	10	20	20	26	—	7 13 10
Marconi-Marine	1	15	10	30/9	+9d.	6 10 1
Oriental Telephone Ord.	1	12	12	2¾	—	*4 7 5

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	—	—	5/–	—	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	,,	5	5	300	—	—
Do. do. Pref. Ord.	,,	8	8	133½	—	5 19 10
Brazil Traction	100	—	—	14¾	−½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	99½	—	5 0 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	10/–	—	—
London United Tram Deb.	Stock	4	4	61½	—	6 10 0
Mexico Trams, 5% Bonds	—	5	5	43½	+13	11 9 10
Mexican Light Common	100	Nil	Nil	12½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	65½	−2	7 12 8
Victoria Falls Ord.	1	15	15	72/6	+1/16	4 2 8
Yorkshire (West Riding)	1	Nil	Nil	5/–	—	—

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	4	18/9	—	4 5 4
Do. Pref.	1	8	8	30/–	—	5 6 8
Babcock & Wilcox	1	15	14	47/–	+9d.	5 19 2
British Aluminium Ord.	1	10	5	25/9	−1/16	3 17 8
British Insulated Ord.	1	15	15	65/–	—	4 12 4
Brush Ord.	Stock	5	Nil	32	—	—
Callender's	1	15	15	2 1/16	−1/16	5 2 0
Do. 6½% Pref.	1	6½	6½	27/6	—	4 14 6
Crompton Parkinson Ord.	5/–	30	24	21/3	+1/16	5 13 0
Do. 8% Pref.	1	8	8	30/–	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	22/9	−6d.	6 11 10
Do. 5% Deb.	Stock	5	5	100	—	5 0 0
Electric Construction	1	Nil	Nil	8/9	—	—
Enfield Cable Ord.	1	25	25	4½	—	5 17 8
English Electric	1	Nil	Nil	10/9	—	—
Do. do. Pref.	1	Nil	Nil	12/6	—	—
Ever Ready	5/–	35	35	27/–	—	6 9 7
Ferranti Pref.	1	7	7	24/6	+9d.	5 14 3
G.E.C. Pref.	1	6½	6½	28/–	—	4 12 10
Do. ord.	1	10	8	40/9	—	3 19 0
Henley's	1	30	30	5 1/16	—	5 1 1
Do. 4½ Pref.	5	4½	4½	5½	+½	4 7 10
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	10	5	1 1/16	—	4 14 1
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	Nil	Nil	10½	+½d.	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

5425. "Television and the like." G. W. Walton. February 20th, 1931. (379303.)

5426. "Natural colour television and kinematography, and apparatus therefor." G. W. Walton. February 20th, 1931. (379317.)

8114. "Electric gaseous-discharge apparatus." Claude-Luminère Soc. Anon. pour les Applications des Gaz Rares à la Lumière Procédés G. Claude. November 5th, 1930. (379271.)

8583. "Wireless system." R. Bruni. March 20th, 1930. (379305.)

11308. "Thermionic valves." Marconi's Wireless Telegraph Co., Ltd., and E. W. Gill. April 16th, 1931. (379306.)

11916. "Electrolytic cells." Aerovox Wireless Corporation. October 18th, 1930. (379299.)

12537. "Electrical high-frequency circuits." Marconi's Wireless Telegraph Co., Ltd., and E. Green. April 28th, 1931. (379325.)

12942. "Synchronous electric motors." Ferranti, Ltd., and W. Holmes. May 1st, 1931. (379383.)

14090. "Signalling installations for traffic control." Siemens & Halske Akt.-Ges. May 12th, 1930. (379326.)

14255. "Printing-telegraph apparatus." Creed & Co., Ltd. (Teletype Corporation). May 14th, 1931. (379273.)

15325. "Indirectly-heated thermionic cathode." Dr. S. Loewe and B. Wienecke. May 28th, 1930. (379334.)

15357. "Inductance coils for wireless transmitters." W. B. Mackenzie, W. Ure and C. Matthews. May 26th, 1931. (379310.)

15524. "Electric switches of the vacuum type." International General Electric Co., Inc. May 28th, 1930. (379342.)

15554. "Tuned electromechanical relays." Siemens-Schuckertwerke Akt.-Ges. August 15th, 1930. (379346.)

15603. "Electric water heaters." A. Reyrolle & Co., Ltd., H. J. Secretan and F. N. Linstow. May 28th, 1931. (379350.)

15632. "Protective apparatus for alternating-current systems." Westinghouse Electric & Manufacturing Co. June 16th, 1930. (379354.)

15635. "Electric protective systems." Westinghouse Electric & Manufacturing Co. June 16th, 1930. (379355.)

15638. "Electric current systems for supplying electric current to sound-reproducing equipment." Electrical Research Products, Inc. September 23rd, 1930. (379356.)

15689. "Variable electrical resistance devices." Gramophone Co., Ltd., J. White and R. E. Spencer. May 28th, 1931. (379359.)

15765. "Electrical systems for internal-combustion engines." Eclipse Machine Co. May 31st, 1930. (379362.)

15766. "Television and like systems." Marconi's Wireless Telegraph Co., Ltd., and L. E. Q. Walker. May 29th, 1931. (379363.)

15768. "High-frequency feeder arrangements suitable for use with radio aerial systems." Marconi's Wireless Telegraph Co., Ltd., and N. Wells. May 29th, 1931. (379364.)

15786. "Mercury-arc rectifiers." General Electric Co., Ltd., and A. T. Bartlett. May 29th, 1931. (379366.)

15806. "Electromagnetic devices." J. Fritcsons. July 11th. 1930. (379369.)

15810. "Telephone plant." Telefonaktiebolaget L. M. Ericsson. May 31st, 1930. (379370.)

15993. "Thermionic oscillation generators." Marconi's Wireless Telegraph Co., Ltd. June 27th, 1930. (379395.)

16270. "Mercury and other conducting-liquid switches." General Electric Co., Ltd., J. S. Cliff, G. E. Davis and W. Wilson. June 4th, 1931. (379403.)

17035. "Electrically operated resonance device for the control of definite operations." Landis & Gyr Soc. Anon. June 12th, 1930. (379419.)

17348. "Wireless receiving apparatus and the like." J. Croysdale and S. R. Wright. June 15th, 1931. (379426.)

17543. "Method of producing highly emissive thermionic cathodes." Radio Akt.-Ges. D. S. Loewe, Dr. H. Benjamin, and E. Ehrig. June 18th, 1930. (379432.)

19516. "Direct-coupled double-channel amplifier employing thermionic valves." W. A. Chambers. July 7th, 1931. (379456.)

20426. "Negative electrodes for electric accumulators." A. Pouchain. July 16th, 1930. (Addition to 282449.) (379468.)

20436. "Electric transformers." Ferranti, Ltd., and G. L. Porter. July 16th, 1931. (379469.)

20663. "Rotary driven coal-cutting machines, electric or compressed-air power." L. Butterworth. July 20th, 1931. (379473.)

20,707. "Plug couplings or connections of electrical wires and the like." L. H. Reid. July 20th, 1931. (Cognate application 23733/31.) (379474.)

23018. "Method of introducing metallic vapours into electric discharge vessels." Radio Akt.-Ges. D. S. Loewe and Dr. H. Benjamin. August 15th, 1930. (379499.)

23400. "Electric accumulators." J. Etchells and Associated Electrical Industries, Ltd. August 19th, 1931. (379502.)

24309. "Method of and means for making joints for oil-filled electric cables." Siemens-Schuckertwerke Akt.-Ges. September 2nd, 1930. (379509.)

24478. "X-ray tube mountings." British Thomson-Houston Co., Ltd. August 30th, 1930. (379512.)

25270. "Electric arc lamps." F. W. Robinson. September 9th, 1931. (379524.)

26377. "Distribution board with fuses adapted to be cut out by hand." F. Driescher. September 21st, 1931. (379531.)

26789. "Generation of electric impulses." Siemens Bros. & Co., Ltd., and H. E. Humphries. September 25th, 1931. (379533.)

27342. "Electric rectifiers." Naamlooze Vennootschap Philips Gloeilampenfabrieken. October 8th, 1930. (379538.)

27658. "Electric lighting fixtures." A. A. Henkel. December 11th, 1930. (379539.)

27967. "X-ray apparatus." Naamlooze Vennootschap Philips Gloeilampenfabrieken. October 11th, 1930. (379540.)

28005. "Methods of insulating electric conductors." British Thomson-Houston Co., Ltd. October 8th, 1930. (379541.)

28229. "Current impulse transmitters for alarm signal installations." Siemens & Halske Akt.-Ges. October 10th, 1930. (379542.)

29504. "Television, electrical transmission of pictures, and the like." G. W. Walton. October 23rd, 1931. (379552.)

32428. "Control systems for electrically driven rope railways and the like." International General Electric Co., Inc. November 22nd, 1930. (379567.)

32466. "Searchlights." L. D. Reymond. November 26th, 1930. (Addition to 357907.) (379568.)

34896. "Secret modulated carrier signalling systems." Telefunken Ges. für Drahtlose Telegraphie and W. Moser. December 16th, 1931. (379586.)

34996. "Wire-wound electrical resistances." Steatit-Magnesia Akt.-Ges. December 22nd, 1930. (379588.)

1932

1298. "Modulated carrier-wave receivers." Marconi's Wireless Telegraph Co., Ltd. January 31st, 1931. (379608.)

1791. "Photo-electric discharge amplifiers." Telefunken Ges. für Drahtlose Telegraphie. January 20th, 1931. (379609.)

2069. "Systems for signalling the positions of electric switches electrically." International General Electric Co., Inc. January 22nd, 1931. (379610.)

2358. "Electrolytic condensers." Naamlooze Vennootschap Philips Gloeilampenfabrieken. February 13th, 1931. (379613.)

3521. "Electrical heating bars and methods of manufacturing the same." Maxim Soc. Anon. Fabrique d'Appareils Thermo-electriques. February 15th, 1931. (379619.)

4500. "Transmission, recording, and reproduction of sound." Telefunken Ges. für Drahtlose Telegraphie. February 13th, 1931. (379626.)

4997. "Electric plug-and-socket couplings." H. Schuster. February 20th, 1931. (379628.)

5696. "Prevention of disturbances in thermionic anode bend detectors." Ideal Werke Akt.-Ges. für Drahtlose Telephonie. February 25th, 1931. (379631.)

7082. "Dynamo-electric machines." British Thomson-Houston Co., Ltd. March 9th, 1931. (379636.)

7996. "Thermostat for regulating the electric current supply to heating apparatus and the like in conjunction with a current relay switch with magnet coil." C. Pohlmann. March 17th, 1932. (379639.)

8024. "Static transformers." E. Wirz. March 17th, 1931. (379640.)

8398. "Electric meters." L. A. Paine. March 21st, 1932. (379642.)

9526. "Television apparatus." Fernseh Akt.-Ges. April 10th, 1931. (379646.)

11034. "Electro-medical bath." H. Stanger. April 22nd, 1931. (379651.)

16692. "Statistical recording devices." Associated Telephone & Telegraph Co. May 23rd, 1930. (Addition to 333163.) (Divided application on 14494/31.) (379378.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 14th :—

Ford. No. 521455. Class 6. Ignition machinery, &c., for motor vehicles.—Ford Motor Co., Ltd., 88, Regent Street, W.1.

Utta. No. 527584. Class 8. Loudspeakers, condensers, and transformers, for use in radio telephony.—Vereinigte Telephon & Telegraphen Fabrik A.G., Vienna. (British representative: E. Hey, Telephone Building, The Hyde, Hendon, N.W.9.)

Author. No. 531772. Class 8. Radio receiving sets and component parts.—Peto Scott Co., Ltd., 77, City Road, E.C.1.

Neo-Mystic Lite. No. 532113. Class 8. Electrically illuminated advertising signs.—A. B. E. Cheeseman, 32, Museum Chambers, Bury Street, W.C.1.

Astarta (lettering and design). No. 532862. Class 8. Electric batteries (not for medical purposes).—Battery Components, Ltd., 13, High Road, Ilford, Essex.

Photronic. No. 534,020. Philosophical and scientific instruments and apparatus for useful purposes.—Western Electrical Instrument Co., Ltd., Weston Works, Kingston By-Pass, Surbiton.

Erinofort. No. 533631. Class 50. Synthetic materials derived from cellulose acetate and sold in plastic and powder form for moulding purposes.—Erinoid, Ltd., 58, Coleman Street, E.C.3.

Dolphs Thinalak Black Baking Varnish.—John C. Dolph Co., Newark, N.J. (lettering and design). No. 522484. Class 50 Insulating varnish or compound for the windings of electrical machines.—John C. Dolph Co., Newark, N.J., U.S.A. (British representatives: White, Langner, Stevens, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, W.C.2.)

The Lighting of Libraries

Speaking at the recent annual conference of the Library Association on "The Artificial Lighting of Libraries," Mr .H. Lingard, chief engineer of the E.L.M.A. Lighting Service Bureau, stated that book-reading was frequently blamed for faulty eyesight, but the cause was usually the faulty lighting under which the book was read. More progress had been made in artificial lighting during the last thirty years than in all previous time, and yet the amount of light available after dark in most libraries was less than a tenth of that available in daytime. The eyes evolved under the adequate illumination of daylight where objects were viewed at long range. To decipher the intricate detail of letterpress seen at close quarters was strain enough in itself, but to this was added the discomfort of inadequate artificial light.

Scientific development during the twentieth century had given us twenty times as much light for the same cost, and public libraries should set a high standard of illumination.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—Extensions, Ewbank Works; Entwistle & Kenyon, Ltd.

Aldershot.—Houses (24), Whyte Avenue and Guildford Road; borough surveyor.

Audenshaw (LANCS).—Houses (61) for the Heaton Park Estate Co., Ltd.

Barnard Castle.—Alterations to post office; J. Earnshaw, builders, Stockton.

Berwickshire.—Extensions, including two pavilions, with electrical and heating work, Gordon Hospital, for the C.C.; Cullen, Lochhead & Brown, architects, 115, Cadzow Street, Hamilton.

Birkenhead.—School, Manor Hill, for the Catholic Authorities; W. Ellis, architect, Union Bank Chambers, Hardshaw Street, St. Helen's.

Birmingham.—Factory premises, Pershore Street; R. Fenwick, Ltd., builders, William Edward Street. Shops, Hagley Road West, Quinton; F. B. Clarke, architect, 14, Temple Street.

Blackpool.—Houses (74), Highfields; F. Wood, borough engineer. Garage, shops and flats, Clifton Drive and Squires Gate, for Messrs. Brammer; Gorst & Crabtree, architect, 7, Birley Street.

Blyth.—Alterations to premises, Newcastle Road; Newsham Co-operative Society, Ltd.

Bollington (CHESHIRE).—Conversion of Brook Bank House into Council offices; H. Q. Farmer, architect, 102, Brock Street, Macclesfield.

Burton-on-Trent.—Additions to factory, Burton Road, for the British Goodrich Tyre Co., Ltd.; G. Hodges & Son, builders, Horninglow Street.

Canterbury.—Additions to tannery, St. Mildred's; Williamson & Son, Stour Street.

Carlisle.—Estate development, Brampton Road; E. A. Wood. Store, Shaddongate; Linton's Cumberland Homespuns, Ltd. Rebuilding premises, Scottish Motor Traction Co., Ltd., Church Street; J. & R. Bell.

Cheriton (KENT).—Houses (23), Oaks Farm Estate; A. S. Lilley, U.D.C. surveyor.

Cheshire.—School, Runcorn (£5,700); county architect, Chester.

Colchester.—Factory for the Anglo-Italian Silk Importing Co., Ltd.; Duncan Clarke & Beckett, architects.

Cornwall.—Elementary school, Truro, for the County E.C.

Darlington.—Grammar school extensions; E. Minors, borough surveyor.

Denton (LANCS).—Houses (82), Victoria Street; U.D.C. surveyor.

Dorchester.—Cinema, Trinity Street; R. A. Thomas, architect.

Dover.—Electricity showrooms and offices, Ladywell; borough surveyor. Greyhound racing track (electrically equipped) at Buckland, for A. Cadman, Ramsgate.

Eastbourne.—Cinema, Pevensey Road, for Luxor (Eastbourne), Ltd.; secretary.

Edinburgh.—Balgreen Primary School for the E.C. (£20,000); Mr. Taylor.

Essex.—Extensions to nurses' home, Colchester Institution; J. Stuart, county architect, Chelmsford.

Exeter.—College hostel for the University College of the South West of England; W. T. Nicholls, Ltd., builders, St. Paul's Road, Gloucester.

Farnborough (HANTS).—Houses (28); U.D.C. surveyor.

Frome.—Houses, Summerhill; U.D.C. surveyor.

Gainsborough.—Houses (100) for the Lincolnshire Rural Housing Co.

Glasgow.—Housing scheme, Cardonald; Glasgow Estates Development Co., Ltd. Houses (200), Croftfoot, King's Park; Western Heritable Investment Co., Ltd. Houses, Quarriebrae Street (420) and Maryhill (54), and shops at West Drumoyne; housing director. Shops, Todd Street, Haghill; Benedetto Bielo. Police boxes (£36,000); Police Committee. Offices, Renfield Street and Bath Street, for the Refuge Assurance Co., Ltd.; S. Birkett, architect, 16, John Dalton Street,, Manchester. Schools, Cardonald and Blackhill Estates; education director. Reconstruction and alterations to Bank of Scotland, Kildrostan Street; A. Balbour & Stewart, architects, 110, Blythswood Street. Reconstruction of house for the Eastpark Home for Crippled Children; J. Fairweather, architect, 182, Trongate.

Grantham.—Business stores for Montague Burton, Ltd., Leeds; Mr. Gomme, chief architect.

Great Yarmouth.—Erection of Regal Theatre for a local syndicate; F. Haward, architect.

Greenock.—Houses (74); director of housing.

Hartley Wintney (HANTS).—Houses (26); R.D.C. surveyor.

Hawick.—Public washhouse (£3,000); burgh surveyor.

Hemel Hempstead.—School, Crabtree Lane, for the Borough E.C.; Major Maule, architect.

Herefordshire.—Isolation block and extensions of nurses' home, Hereford General Hospital (£10,025); Nicholson & Clarke, architects.

Irish Free State.—(ENNIS, Co. CLARE).—County hospital; secretary, Clare Board of Health.

Isle of Axholme.—Houses (82); R.D.C. surveyor.

Kent.—Central school. Hersden, Sturry; Major W. H. Robinson, county architect, Maidstone.

Kingston-on-Thames.—Club premises and sports stadium (£30,000). Norbiton Hall Estate; A. Bell.

Largs (AYRSHIRE).—R.C. Church; Rev. J. Doherty, St. Mary's, R.C. Rectory.

London.—(CAMBERWELL).—Factory, Farmers Road, for Dennison, Kett & Co., Ltd.; D. J. Moss, architect, 11, Queen Victoria Street, E.C.4.

Luton.—Water tower and engine house, with pumping plant, Slip End; H. Pickering, R.D.C. surveyor, 73, West Parade, Dunstable.

Manchester.—Houses (2000), Wythenshawe Estate, Northenden; L. Heywood, housing director, Town Hall. Municipal flats (22), Newton Heath; housing director, Town Hall. Additions to tobacco factory, Gould Street, Old Mount Street and Ludgate Street, for the Co-operative Wholesale Society, Ltd.; Building Department, C.W.S., Ltd., Vere Street, Salford.

Market Rasen.—Houses (36), Mill Lane; U.D.C. surveyor.

Melbourn (CAMBS).—Houses (30); F. Hale & Sons, builders, Sutton, Ely.

Millport (BUTESHIRE).—Restoration, Keppel Pier (£6,000); burgh surveyor.

Northern Ireland.—(BALLYMONEY).—Enlarging and renovating to Town Hall (£5,493); H. Taggart.

Oakham.—Houses (22); U.D.C. surveyor.

Oldbury.—Houses (90), Langley; U.D.C. surveyor.

Penrith.—Houses (40); A. Knewstubb, R.D.C. architect, St. Andrew's Chambers. Cinema, Middlegate, for Penrith Alhambra Theatre and Picture House, Ltd.; R. H. Deans, architect, Burnley.

Pontefract.—Dairy, Horsefair, for the Co-operative Society, Ltd.; secretary.

Portland.—Municipal offices (£7,000); Petter & Warren, U.D.C. architects, Yeovil.

Portsmouth.—Houses (260), Southampton Road; borough surveyor. Development of Langstone Sanatorium; Dr. Fraser, medical officer of health. Shop and factory, Kingston Road; Portsea Island Co-operative Society, Ltd. Additions to Drayton Institute, Havant Road; Cortis & Hankin. Rebuilding offices, &c., 72, St. George Square; W. Pink & Sons, Ltd.

Prestwich.—Extension of buildings at County Mental Hospital; Cruickshank & Seward, architects, Crown Buildings, 18, Booth Street, Manchester.

Rugby.—Head post office, North Street; T. Bates & Son, builders, 51, Warwick Street, Earlsdon, Coventry.

Salisbury.—Water supply scheme, with turbine pumps (£14,600); city engineer.

Smethwick.—Handicraft centre at Waterloo Road, for the E.C. (£1,810).

Southampton.—Omnibus station; K. Wilson, builder, Parkstone, Dorset.

Southport.—Houses, Guildford Road; A. E. Jackson, borough engineer.

Spilsby.—Extensions, Poor Law Institution, for Lindsey C.C.; H. G. Gamble, county architect, Bank Street Chambers, Lincoln.

Stafford.—Houses (80), New Common; borough surveyor.

Stirlingshire.—Conversion of Burngreen School, Kilsyth, into county library centre; executive officer, Stirlingshire Education Authority.

Stockport.—Greyhound racing track, Kay's Fields, for the Greyhound Racers, Ltd.; J. C. Derham, architect, Empress Buildings, Church Street, Blackpool. Senior elementary school, Lisburne Lane, Great Moor; Architects' Department, Education Offices. Extensions to tobacco factory for E. Robinson & Sons, Ltd.; P. Peirce & Son, architects, 39, St. Petersgate.

Swindon.—Greyhound race track, Gorse Hill; Stanford & Co. Building estate, Linsdale Street; Bishop & Fisher. Schools, Pinehurst; G. Randel, architect, Smethwick.

Taunton.—Houses (88), Lambrook site; I. F. Shellard, borough engineer.

Tiverton.—Cinema, Fore Street; Eastmond & Hamlin.

Tunstall (STAFFS).—Factory, High Street, for Wedgwood & Co., Ltd.

Wakefield.—Maternity hospital ante-natal clinic, child welfare centre and staff quarters, Manygates Park; L. Ives, city surveyor, Town Hall.

Whitby (YORKS).—Houses (302), Gallows Close; J. R. Seward, U.D.C. surveyor, Council Offices.

Wigan.—Houses (32), Whelley, for J. & T. Pyke.

Wolverhampton.—Headquarters (electric lighting and heating installations), Queen's Square, for Wolverhampton Freeholders Permanent Benefit Building Society, Ltd.; Cleland and Hayward, architects, 36, Waterloo Road.

York.—Rebuilding scheme, County Hospital; secretary.

The First Neon News Sign

What is claimed to be the first neon news sign in the world has been erected during the past few days in a commanding position facing Piccadilly Circus. It was designed and manufactured for the *Star* by Boro' Electric Signs and in commemoration of its installation a special edition of the paper was printed for private circulation.

The sign, which is 10 ft. high and 35 ft. wide, embodies several important technical features, among which is the method of flashing the news across a strip composed of several hundreds of low-voltage blue neon 21/22 mm. units, each of which is individually troughed and connected to the scintillating mechanism, contact being made through the holes of a moving strip of paper punched out with the wording of the message. Special high-speed apparatus instantaneously extinguishes each unit, thereby eliminating any " trail " and ensuring clear-cut lettering. The name of the paper is in 13/14 mm. red, the main border 21 mm. green, and the slogan in double-outline 13/14 mm. light blue neon. The star symbol is in the new golden neon (13/14 mm.), and flashing mechanism produces a twinkling effect.